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RHOICININE SPIDERS (PISAURIDAE)  
OF WESTERN SOUTH AMERICA

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INTRODUCTION

A considerable number of rare spiders belonging to the little known subfamily Rhoicininae have been collected since 1950. Most of these were taken in Chile by Dr. E. S. Ross and Dr. A. E. Michelbacher (1950 to 1951), and in Peru by Dr. E. I. Schlinger and Dr. Ross (1954), for the California Academy of Sciences. Important additional material was collected by Mr. Felix Woytkowski for the American Museum of Natural History, and by Prof. Dr. W. K. Weyrauch, University of San Marcos, Lima, Peru. This material greatly increases our knowledge of the group.

Three specimens of *Rhoicinus rothi*, new species, from central Peru, are the first males of *Rhoicinus* to be described. These, with females of several species, are the basis for a study of the genital structures of the genus. The type species of *Rhoicinus*, *R. gaujoni* Simon, is redescribed in detail, and three other new species from central Peru are proposed.

*Calacadia*, a new genus from central and southern Chile, contains four new species. A study of the genitalia of both sexes is presented. Three species previously included in *Rubrius* (Agelenidae) are here placed in *Calacadia*: "*Clubiona*" *ambigua* Nicolet, "*Myndes*" *dentifer* Tullgren, and *Rubrius radulifer* Simon. Original descriptions of *C. dentifera* (Tullgren) and

1. Mrs. Don L. Frizzell, Rolla, Missouri.

*C. radulifera* (Simon) and Simon's clarification of *C. ambigua* (Nicolet) give sufficient data to place them in *Calacadia*, but it is impossible to identify recently collected material with them without recourse to type specimens. Specific determination depends mostly on careful study of the genitalia, which earlier authors did not describe adequately.

An outline of the zoogeography of rhoicinine spiders is included, with a map showing the localities of genera.

### ACKNOWLEDGMENTS

Dr. R. C. Miller, Director, and Dr. E. S. Ross, Curator of Insects, California Academy of Sciences, have placed the Academy's splendid collection of spiders at my disposal. Prof. Dr. Max Vaehon, Director of the Zoological Laboratory, Muséum National d'Histoire Naturelle, Paris, has been most obliging in lending a specimen of *Rhoicinus gaujoni* Simon, the type species of the genus. Mr. Vincent D. Roth, Entomological Research Branch, U. S. Department of Agriculture, Yuma, Arizona, pointed out the presence of rhoicinine spiders in the collection at the California Academy of Sciences, and located several specimens in the collection of the American Museum of Natural History. Dr. Willis J. Gertsch, Curator of Spiders at the American Museum of Natural History, has lent me material from their collection, and Prof. Dr. W. K. Weyrauch, University of San Marcos, Lima, Peru, is sharing his collection of Peruvian spiders with me.

### Family PISAURIDAE

#### Subfamily RHOICININAE Petrunkevitch, emend. Exline, 1950

*Rhoicineae* SIMON, 1898, Hist. Nat. Araign., ed. 2, tome 2, pp. 320-322, figs. 328-330.

*Rhoicineae* PETRUNKEVITCH, 1928, Connecticut Acad. Arts. Sci., Trans., vol. 29, pp. 9, 38; 1939, *ibid.*, vol. 33, p. 166.

*Rhoicininae* EXLINE, 1950, Amer. Mus. Novitates, no. 1470, pp. 2-3.

Eyes in two parallel rows, about equal in size, all dark (except *Rhoicinaria*); trochanters rebordered and notched; trichobothria in irregular double rows on tibiae, metatarsi, and tarsi; no scopulae on legs; upper claws of tarsi pectinate with many teeth; labium notched at base; lower margin of fang groove with two or three teeth; anal tubercle divided; lorum of pedicel divided, and anterior piece notched to receive projection from posterior piece; colulus present and large. Where known, female carries egg-sac attached to posterior spinnerets.

DISCUSSION. Three genera are placed in the Rhoicininae: *Rhoicinus* Simon, 1898; *Rhoicinaria* Exline, 1950; and *Calacadia* Exline, new genus. Most species of *Rhoicinus* are of moderate length, with long legs, lysosid in

general appearance, and semitropical in habitat. As reported by Simon, the female weaves a sac for her eggs that is unseamed, and carries it by attachment to her posterior spinnerets.

*Rhoicinaria* agrees with *Rhoicinus* in general appearance and tropical to semitropical habitat, but the only species known, *R. roreræ* Exline, is smaller, with shorter legs. Females carry the egg-sac attached to the posterior spinnerets.

The inclusion of *Rhoicinaria* with the pisaurids has been quite reasonably questioned by Dr. Heinrich Homann of Göttingen, Germany (1952, pp. 356–358). In his exhaustive studies on the structure of spider eyes, he found that the color is stable in related groups. Pisaurids, including *Rhoicinus*, have eight dark eyes. In *Rhoicinaria* only the anterior median eyes are dark. *Rhoicinaria* also bears some plumose hairs, which Dr. Homann did not find on *Rhoicinus gaujoni*. Many pisaurids have plumose hairs, and I have found them on *Rhoicinus wallsi* and on *R. weyrauchi*, although careful examination of a piece of cleared skin is required to see the detailed structure. Dr. Homann agrees with my conclusion that *Rhoicinaria* cannot be placed in the Agelenidae, where he would put it on the basis of its eye structure, because of the notched trochanters, trichobothria, and divided anal tubercle; nor can it be included in the Lycosidae because of the disposition of the eyes in two rows, the colulus, and lack of tarsal scopulae.

*Rhoicinaria* is similar to *Rhoicinus* except for eye color. The genitalia, however, are very simple in comparison, and may represent a primitive condition (see "Genitalia" below). The complex female genital plaque of *Rhoicinus* could have been derived from an ancestral form similar to *Rhoicinaria*, by a greater sclerotization and division of the pair of spermathecae in *Rhoicinaria*, and by the development of the protective flange of the fertilization duct. The external openings are on the under posterodorsal side of the plaque in both genera. The male palps of the two genera show much the same relationship. *Rhoicinaria*, therefore, may represent an ancestral group of rhoicinine spiders, bridging the Agelenidae and Pisauridae, or its ancestral affinities might be quite different from *Rhoicinus*, with convergent evolution of characters. With no other data available, it seems best to retain *Rhoicinaria* in the Rhoicininae.

*Calacadia*, new genus, includes several species living in temperate to cool temperate regions of central to south Chile. These are spiders of moderate size with shorter legs than *Rhoicinus*, and agelenid rather than lycosid in appearance. Plumose hairs were not found on a skin preparation of *C. chilensis*. The third claw appears under ordinary magnification to lack teeth, but when enlarged 100 to 150 diameters, one to three long, very fine teeth are visible. The external openings for the female genitalia are on the ventral side of the genital plaque, and the internal structures, as well as the structures of the male palp, are different from *Rhoicinus*. The habits of *Calacadia*

are unknown, but it seems doubtful that the female attaches her egg-sac to the posterior spinnerets, which are rather weak and bear only about a dozen spinning tubules at the tip of the second segment.

The relationship of these genera is not close. Except for the difference in eye color, *Rhoicinaria* and *Rhoicinus* are considered primitive and highly specialized genera, respectively, of the same stock. *Calacadia*, which agrees with *Rhoicinus* in having only dark eyes, differs in several important characters, and its highly specialized genitalia have no evolutionary affinity to those of *Rhoicinus*.

#### GENITALIA

The terminology and interpretation of genital structures in general follow those of Gering (1952) for Agelenidae (wherever applicable) and Comstock (1912, 1940) for Pisauridae. As some of the structures found in the Pisauridae are different from agelenid genitalia and are not covered by Comstock, several simple and obvious terms are coined.

**Rhoicinaria.** The genitalia of *Rhoicinaria* were described in 1950 (Exline, pp. 8, 10, figs. 9-14). The female genital plaque is not heavily sclerotized, except for the undulating posterior border, and tufts of long hairs are lateral to it. A pair of large, almost contiguous spermathecae are visible through the external chitin. Openings into the internal structures, on the dorsal side near the posterior edge, enter simple bent connecting tubes that empty into the spermathecae. The fertilization ducts drain the connecting tubes instead of the spermathecae.

The palp of *Rhoicinaria rorerac* is simple, with a slight cavity and projection at the distal, retrolateral margin of the tibia. Near the tip of the bulb, the tegulum gives rise to a simple embolus and a pale, simply projecting conductor on the ectal side; on the prolateral side is a short, hooked median apophysis; a heavily sclerotized ridge lies between the median apophysis and embolus.

**Rhoicinus.** The genital plaques of *Rhoicinus* are similar in structure, although the shape and details of the internal structures vary with the species. They are usually heavily sclerotized, protruding posteriorly beyond the genital groove. Long hairs on each side usually obscure the posterior part of the plaque. Short hairs of equal length cover the central portion, which in most species is depressed. The external openings are on the posterodorsal surface. A pair of well separated, darkened areas marks the position of the ventral spermathecae. Dark chitinous bands and pale areas near the posterior border give the impression of internal connecting tubes; this is misleading. The bands and pale areas are reflected on the posterodorsal side, and may form a groove with lateral ridges, to guide the male embolus to the external

opening during mating. The openings are a considerable distance from the posterior margin and appear as deep pits in the very heavily sclerotized chitin surrounding them. They are widely separated.

Internally, each opening leads into a heavily sclerotized mass, the structure of which has been determined only for *R. weyrauchi*. Two chambers



Map 1. Outline map of South America, showing distribution of genera of the subfamily *Rhoicininae*.

connect with this mass, an anterior and a ventral spermatheca, in all species studied. Both spermathecae are small compared to the size of the plaque, and differ somewhat in size and position in the various species. On the dorsal side of the plaque, a wide, sickle-shaped, almost membranous flange arises medially, just posterior to the central mass, and extends anteriorly for some distance. Its size, width, and length vary with the species. Along its lateral border, it supports the fertilization duct, which empties into the vagina a considerable distance anterior to the genital groove. The duct is membranous and difficult to see in *R. weyrauchi* and *R. andinus*, but has a heavy chitinous wall in *R. schlingeri*.

The genital plaque of the holotype of *R. weyrauchi* (figs. 11, 13) has been cleared and mounted for examination with a compound microscope. The ventral and anterior spermathecae and central mass are partly visible through the external chitin without removal of the plaque. When cleared, the central mass is seen to contain two separate chambers, a central and a dorsal spermatheca, and passages between the four spermathecae become visible. Each external opening leads into the central spermatheca, and this opens either directly or by connecting ducts to the other three chambers, each at a different level. The anterior spermatheca is at the same level as the central, connected to it by a short, wide duct. Probably the male embolus passes through the central spermatheca into the anterior chamber during mating. Near its ventral posterior margin, the central spermatheca opens into the ventral chamber; on its dorsal side, it leads directly into the dorsal chamber. The fertilization duct drains the dorsal spermatheca. The spermathecae are all small with heavy walls, which in the central and dorsal coalesce into the single mass.

The male is known only for *R. rothi*. The palp (figs. 2, 2a, 5, 14) has an undifferentiated patella. The tibia is peculiarly modified at its distal, retro-lateral side by a large, sunken, unsclerotized pit, surrounded by a fairly high, rebordered, chitinous ring. On the pro-lateral side, the tibia bears two very long, heavy spines. The cymbium of the tarsus is elongate and greatly attenuated distally; it is thickly covered with hairs, which on the ventral side of the base are long and almost cover the bulb. Dorsally near the base, the cymbium bears a very long, heavy spine. The bulb is attached by a voluminous basal haematodocha, provided with a petiole and attached to a large circular area in the middle of the alveolus. It is broadly attached at its distal end to the subtegulum, which is poorly sclerotized except for a distal ring. There appear to be four wide annuli on the wider side of the subtegulum, but these are unpigmented. A small haematodocha may lie between the subtegulum and the tegulum. The tegulum is large, almost flat on its anteroventral face, bearing three processes distally. The most ventral is the narrow, membranous, elbowed conductor, which appears to support the basal part of the embolus. On the distal median surface of the tegulum, a huge process arises, presumably the median apophysis; it is heavily sclerotized, with a broad irregular base from which a long, heavy setal arm extends anteriorly. This arm is wrench-shaped with a distal hook, and is the most conspicuous part of the bulb. The terminal division (see fig. 2a) is divided into several sclerites: a radix, the exposed side of which is heavily sclerotized and raised into a blunt point; a stipes, attached distally to the radix; the embolus, a distal projection of the stipes; and a large flange arising laterally from the stipes without articulation, presumably a terminal apophysis or homologous to one. The embolus is long, irregularly and partially coiled, stiff, fairly robust, and heavily pigmented. The terminal apophysis, perhaps homologous to the

"fulerum" of Comstock (1912, pp. 118, 119; figs. 114, 115) is almost flat and bears a tiny hook at its tip. The seminal duct can be traced from the embolus through the stipes, radix, and in part through the tegulum. The embolus seems to lie, in the basal part of its length, in the curve of the conductor; its tip lies in the hook of the terminal apophysis, and its entire length is protected by the arm of the median apophysis.

**Calacadia.** The genitalia of *Calacadia* are as complex as those of *Rhoicininus*, but are entirely different in structure. In the female, the openings to the internal structures are on the ventral side of the plaque; in the male palp, the terminal apophysis and embolus arise from the tegulum at its posterior retrolateral margin, and the patella of the palp is modified.

The female genital plaque (figs. 28, 31, 34, 35) is large, with only moderate sclerotization of the external chitin; the surface is considerably rounded in *C. chilensis*, flat in *C. rossi*. Externally, two longitudinal copulatory ridges are widely separated and arched toward one another. Differing with the species, they vary in length, degree of arching, and height raised. They are inconspicuous, long, and low in *C. rossi* and *C. chilensis*, short but conspicuous in *C. coquimbensis*, and raised well above the surface in *C. osorno*. Medial to, or under the ridges, copulatory grooves lead to the external openings at their posterior extremity. The ridge and groove of each side probably guide the male embolus to the opening during mating. The openings are hidden below the posterior extremity of the ridge. The ridges sometimes end in a sharp point, or a chitinous point may be present posterior to the ridge.

Through the external chitin, part of the internal structures can be discerned: a pair of large medial chambers, the spermathecae; parts of the connecting canals and copulatory tubes anterior to the spermathecae; and posterior to them the fertilization canal or chamber.

The internal structures are complex but similar in the species studied (figs. 30, 32, 33, 36). From each external opening a wide, sclerotized copulatory tube extends posteriorly, makes a wide loop medially, anteriorly, and then laterally on the dorsal side of the plaque, half of which it almost completely outlines. The copulatory tube is analogous and perhaps homologous to the bursa of *Agelenopsis* (Gering, 1952); it terminates in a large diverticulum on the lateral side of the plaque, into which the male embolus may penetrate during mating. Near the union of the copulatory tube and the diverticulum, a connecting canal, usually narrower than the copulatory canal, loops medially and posteriorly, dorsal to the spermatheca, emptying into the latter on its posterolateral side. The shape, position, and size of the spermathecae differ somewhat in the various species, but are usually large, medial, ventral chambers, and except in *C. coquimbensis* are contiguous. They empty posteriorly in most species, almost medially in *C. chilensis*, into

a large, heavily sclerotized chamber (in *C. chilensis*) or tube (*C. rossi*, *C. osorno*, and *C. coquimbensis*); when this is tubular, it is often much twisted and coiled. The fertilization canal or chamber is drained by a normally narrow, short fertilization duct.

The male palp is as uniform in structural outline in the two species studied, *C. chilensis* and *C. coquimbensis*, and in those previously described, *C. dentifera*, *C. ambigua*, and *C. radulifera*, as are the genitalia of the female. The patella has a large radula of fine, regular, sharp teeth on its outer side, sometimes on a short apophysis. The lateral side of the tibia bears a distal apophysis with a long ventral fold or carina, and in some species a short, basal, thumb-like, but unsclerotized apophysis. The apophyses of the patella and tibia somewhat resemble those of *Cybaeus*. The bulb of the tarsus, however, is very different, and shows the affinity of the genus to the Pisauridae. The embolus is long and whip-like, emerging from the tegulum at the lateral posterior margin of the unexpanded bulb. In its entire length (*C. coquimbensis*), or nearly so (*C. chilensis*), the embolus is enclosed by a long, stiff terminal apophysis, arising from the tegulum at the outer side at the base near the embolus, and extending along the entire side of the bulb. The terminal apophysis is a thin, heavily sclerotized sheet, rolled ventrally until almost closed, forming a large, deep groove, almost a tube, for the embolus. It appears to be homologous to the "fulcrum" of Comstock (1912, 1940, pp. 118, 119), described for more typical pisaurids. The conductor arises from the tegulum about midway of the length of the bulb, dorsal to the embolus and terminal apophysis. It is almost transparent and very thin. A heavy, more or less pointed or hooked median apophysis arises from the tegulum in the center of the bulb.

#### ZOOGEOGRAPHY

Rhoicinine spiders are exclusively west South American (see map). Species of *Rhoicinus*, although little known and poorly represented in collections, occur in all the northwestern tropical and subtropical countries of South America: *R. wapleri* Simon was described from Venezuela, and an immature female of *Rhoicinus* from Colombia, Province of Narino, is in the collection of the California Academy of Sciences. Western Ecuador is represented by *R. wallsi* Exline, from the southern coastal region, and eastern Ecuador on the Ecuador-Peruvian border, eastern slope of the Andes, by *R. gaujoni* Simon. *Rhoicinus rothi* Exline, *R. schlingeri* Exline, *R. andinus* Exline, and *R. weyrauchi* Exline, are all inhabitants of Andean river valleys of central Peru. Spiders belonging to species of *Rhoicinus* are probably far more common in these countries than their representation in collections would indicate.

*Rhoicinaria roreræ* Exline lives in coastal river valleys of northern Peru



and southern Ecuador, along the Chira River (Peru: Department of Piura), and in the Guayas River Valley (Ecuador: Province of Guayas). These little spiders inhabit damp or swampy areas in tropical or semitropical climates, often living in banana groves. Their occurrence in all the permanent coastal river valleys from Panama to Trujillo, Peru, may be postulated.

Species of *Calacadia* extend from central to southern Chile in temperate to cooler climates, and from coastal to mountainous terrain. *Calacadia coquimbensis* Exline is the most northern representative, the female having been collected in the Province of Coquimbo, central Chile. *Calacadia rossi* Exline lives in the Province of Nuble, central Chile. *Calacadia chilensis* Exline, *C. osorno* Exline, *C. radulifera* (Simon), *C. ambigua* (Nicolet), and *C. dentifera* (Tullgren) are all in southern Chile. *Calacadia chilensis* has a fairly wide range, from the Province of Cautín to the Province of Osorno.

*Rhoicinus* and *Rhoicinaria* overlap geographically, *Rhoicinus* living in the north Andean semitropical river valleys and *Rhoicinaria* in tropical or semitropical coastal valleys. As reflected in geographical relationship, these two genera are in most respects closely related, with *Rhoicinaria* being more primitive and nearer the ancestral stock. *Calacadia*, living in the cool temperate coastal to mountainous terrain of southern Chile, is geographically distant from *Rhoicinus* and *Rhoicinaria*, and is also far removed from that stock morphologically.

### TAXONOMY

#### KEY TO GENERA

1. All eyes dark..... 2  
 Eyes light except for anterior median eyes, which are smaller than others; clypeus low; three pairs of spines under anterior tibia (none distal); genitalia simple; female with one pair of large spermathecae, openings on posterodorsal side of genital plaque; male palp with small process and excavation on distal ectal side of tibia, bulb very simple....*Rhoicinaria* Exline; Peru, Ecuador
2. Posterior eye row recurved, eyes about equal in size; lower margin of cheliceral fang groove with three teeth; posterior spinnerets longer than anteriors and robust; clypeus higher than diameter of anterior median eyes; usually three pairs of spines or spinelike bristles under anterior tibia; genital plaque of female with exterior openings on posterodorsal surface.....  
 .....*Rhoicinus* Simon; Venezuela, Colombia, Ecuador, Peru
- Posterior eye row nearly straight, anterior median eyes smaller than others; lower margin of fang groove with two teeth; posterior spinnerets much less robust than anterior pair, and not much if any longer; clypeus low, no wider than diameter of anterior median eyes; four or five pairs of ventral spines on anterior tibia (three in *C. osorno*); genital plaque of female with external openings on ventral surface.....  
 .....*Calacadia* Exline, new genus; central to southern Chile

Genus **Rhoicinus** Simon, 1898.

*Rhoicinus* SIMON, 1898, Histoire Nat. Araign., ed. 2, vol. 2, pp. 320–322, figs. 328–330.  
—Exline, 1950, Amer. Mus. Novitates, no. 1470, pp. 3–6, figs 6–8.

*Type species. Rhoicinus gaujoni* Simon.

Carapace with cephalic region blunt in front, sides parallel, narrower than thoracic; thoracic part rounded on sides with longitudinal thoracic groove; chelicerae slightly geniculate with prominent boss and short, heavy fang, margins of fang groove each with three teeth. Maxillae parallel, usually converging slightly over lip; lip almost as broad as long, notched in basal portion. Sternum broad, undulating on sides, concave in front, produced posteriorly between hind coxae. Eyes all dark, in two somewhat recurved rows, anterior row much shorter than posterior; eyes about equal in size or anterior medians a little smaller.

Legs 4123 or 4213, with trochanters conspicuously notched, trichobothria in two rows on tibiae, metatarsi, and tarsi; legs usually clothed with long, fine hairs that are curved at tips; no scopulae but with tarsi densely clothed with short hairs; spiny, usually three pairs under tibiae, and third and fourth tibiae with a dorsal spine, besides two to three lateral spines on each side; tarsi with upper claws having many (7–14) teeth, and lower claw usually with one tooth, and a pair of false accessory claws present.

Abdomen ovate, usually with very inconspicuous plumose hair; spiracular groove usually a little in front of spinnerets. Lorum of pedicel with two parts, anterior notched and posterior projecting as in *Dolomedes*. Colulus large; spinnerets robust, anterior pair short, almost contiguous, median pair very slender and fairly long, posterior pair separated, with a short but well developed second segment, longer than anterior pair; anal tuberele divided. Genitalia as described above.

## KEY TO FEMALES OF RHOICINUS

(Note: Insufficient data were included in the description of *R. wapteri* Simon, from Venezuela, to place it in the key; it is only 6 mm. long, with poorly sclerotized genital plaque. See "*R. wapteri*" Exline, 1950, pp. 3–6; error for *R. wapteri*.)

1. Leg 1 longer than leg 2..... 2  
    Leg 2 longer than leg 1..... 4
2. Clypeus only half as high as area of anterior median eyes; sternum almost as wide as long; posterior spinnerets about a half longer than anterior pair; about 9 mm. long; genital plaque with central part projecting well behind genital groove.....*R. schlingeri* Exline, new species  
    Clypeus about two-thirds as high as median ocular area, or more..... 3
3. Tibia 1 with two dorsal spines; cephalic region wide, not much narrower than thoracic; median ocular area narrowed anteriorly; about 8 mm. long; genital plaque projecting far behind genital groove, evenly narrowed to blunt posterior edge; ventral spermathecae as seen through external chitin separated by only two diameters.....*R. wallsi* Exline, 1950

- Tibia 1 without dorsal spines; median ocular area square; about 10 mm. long; genital plaque projecting behind genital furrow with posterior edge uneven but blunt; ventral spermathecae as seen through external chitin widely separated, by more than three times diameter.....*R. gaujoni* Simon, 1898
4. Clypeus about two-thirds as high as median ocular area; median ocular area rectangular, longer than wide; anterior median eyes a little smaller than others; about 10 mm. long; genital plaque rounded behind with wide median and a pair of lateral scallops, and posterior pair of large triangular pale areas.....*R. rothi* Exline, new species
- Clypeus only half as high as median ocular area or less..... 5
5. Clypeus less than half height of median ocular area, which is longer than wide, a little narrowed in front; anterior median eyes a little smaller than others; about 11 mm. long; genital plaque with posterior margin evenly curved, broken by a pair of long slits.....*R. andinus* Exline, new species
- Clypeus about half height of median ocular area; median ocular area rectangular with eyes equal in size; small species, about 5 mm. long; genital plaque not projecting behind furrow, wide and blunt behind; internal structures widely separated as seen through external chitin, which is not heavily sclerotized.....*R. weyrauchi* Exline, new species

### **Rhoicinus gaujoni** Simon.

(Figures 4, 6.)

*Rhoicinus gaujoni* Simon, 1898, Ent. Soc. France, Bull., 1898, no. 5, p. 129; 1898, Hist. Nat. Araign., ed. 2, tome 2, p. 322, figs. 328-330.

FEMALE. Total length, 9.86 mm.; carapace 4.93 mm. long, 3.91 mm. wide, 1.67 mm. high. Carapace brown, darkest on sides of cephalic region; chelicerae very dark brown; maxillae, lip, and sternum light reddish-brown; legs pale, almost orange, with pale gray annulations under femora (in the holotype female, the anterior tibiae are also annulate, according to Simon). Abdomen dark gray, lacking pattern except for large pale basal marking over heart area; venter pale yellow with genital plaque and spinnerets reddish.

Carapace broad, rounded on sides, quite flat; cephalic region wide but considerably narrower than thoracic, sides parallel, blunt in front; longitudinal thoracic groove conspicuous, cephalic grooves shallow. Chelicerae moderate in size with well developed boss, slightly geniculate, fang short and heavy, fang groove well developed with 3 stout teeth bordering each margin and lightly scopulate on anterior margin. Maxillae parallel, somewhat converging over lip, blunt in front, scopulate on inner anterior border. Lip almost as broad as long (Simon described lip much longer than wide), notched in basal third or fourth, tapering on sides and blunt in front.

Sternum (fig. 4) broad, little longer than wide, rounded and undulating on sides, concave in front, abruptly produced behind between posterior coxae; coxae cylindrical, trochanters rebordered and conspicuously notched.

Eyes all dark, about equal in size, in two somewhat recurved rows, pos-

terior row considerably longer than anterior. Eyes of anterior row almost equally spaced; posterior row with median eyes less than a diameter apart and farther from laterals. Median ocular area square; clypeus high and perpendicular, two-thirds as high as ocular area.

Legs long, rather slender, covered with long fine hairs most of which are recurved at tips; spines slender and only moderately long; trichobothria in two rows on tarsi, metatarsi, and tibiae; tarsi thickly covered with hair especially underneath, but without scopulae; tarsi with onychium; leg 3, upper claws with 12 teeth, lower claw one, and a pair of false accessory claws present. Length of legs:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	4.65	5.77	4.00	2.14	16.56
2 .....	4.65	5.49	4.00	2.05	16.19
3 .....	4.19	5.02	3.37	1.51	14.06
4 .....	5.12	6.14	5.12	2.05	18.43

Spines of legs: Leg 1. Femur, 8 dorsal (3 in midline, 2 pro- and 3 retrolateral); patella, 1 pro- and 1 retrolateral; tibia, 3 pairs ventral (slender, 1 pair distal), 2 pro- and 2 retrolateral; metatarsus, 3 pairs ventral, 3 pro- and 2 retrolateral. Leg 2. Femur, 7 dorsal in two rows, 4 small retrolateral; patella, 1 pro- and 1 retrolateral; tibia, 3 pairs ventral, 2 pro- and 2 retrolateral; metatarsus, 3 pairs ventral, 2 pro- and 2 retrolateral. Leg 3. Femur, 1 small prolateral, 3 rows of 3 each, dorsal; patella, 1 pro- and 1 retrolateral, 1 distal bristle; tibia, 1-2-2 ventral, 1 pro- and 1 retrolateral, and 1 dorsal; metatarsus, 2-2-3 ventral, 3 pro- and 3 retrolateral. Leg 4. Femur, 6 scattered dorsal; patella, 1 pro- and 1 retrolateral; tibia, 1 dorsal, 2 pro- and 1 retrolateral, 3 pairs ventral (1 basal vestigial); metatarsus, 1-2-3 ventral, 3 pro- and 3 retrolateral.

Genital plaque broadly tongue-shaped, blunt but unevenly terminated posteriorly, considerably produced beyond genital groove. Median area

PLATE I (Enlargements approximate)

Figure 1. *Rhoicinus rothi* Exline, new species, allotype male ( $\times 4$ ).

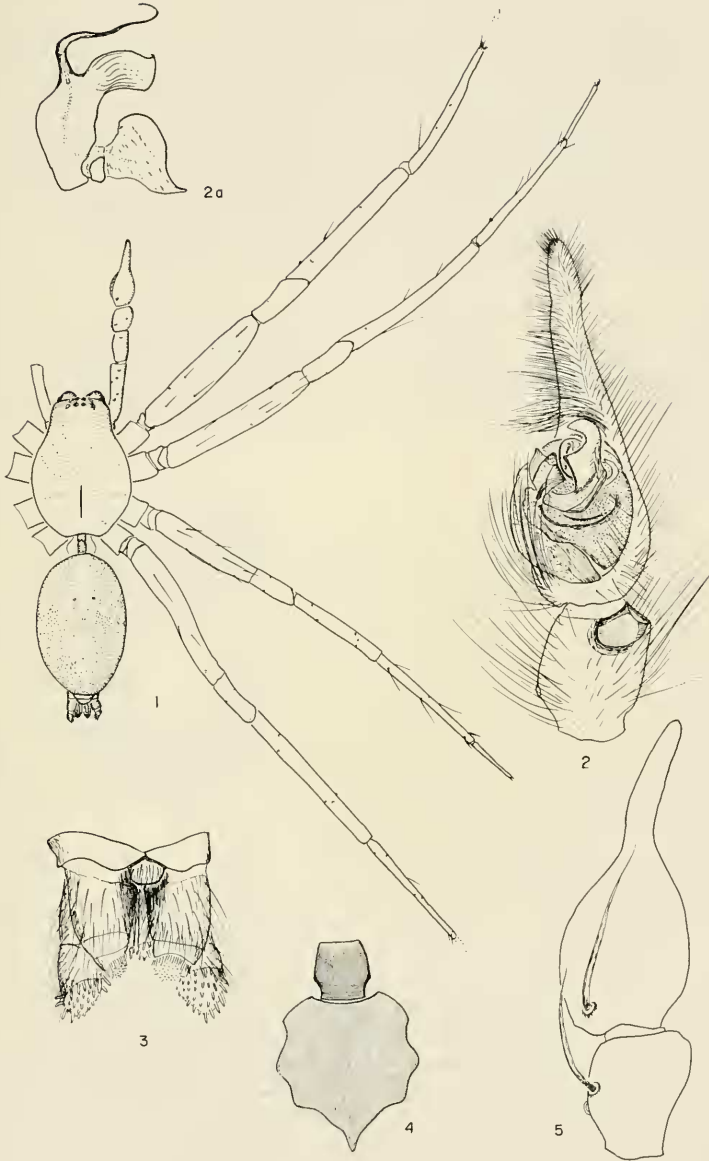
Figure 2. *R. rothi* Exline, new species, palp of allotype male ( $\times 19$ ).

Figure 2a. *R. rothi* Exline, new species, dorsal view of terminal division of expanded bulb; radix is horizontal, stipes divided distally into the embolus and terminal apophysis.

Figure 3. *R. andinus* Exline, new species, spinnerets and colulus of female holotype, ventral view ( $\times 19$ ).

Figure 4. *R. gaujoni* Simon, sternum and lip ( $\times 8$ ).

Figure 5. *R. rothi* Exline, new species, dorsal view of palp of male paratype ( $\times 19$ ).



nearly round and flat, covered with long, white hairs. Laterally, plaque is raised with a small darkened area on each side, probably marking ventral pair of spermathecae. Darkened areas near posterior edge are probably heavily sclerotized bands of chitin. Openings on posterodorsal surface, well separated.

Spinnerets heavy, anterior pair short, a little separated, preceded by a short, wide colulus; median pair almost as long as anterior pair, but much more slender; posterior pair as heavy as anterior and considerably longer, with a short conical second segment, well provided with spinning tubules. Anal tubercle conspicuously two-segmented.

REMARKS. The description is based on a female (Tube 10382, Simon Collection, Muséum National d'Histoire Naturelle, Paris). This is probably one of a suite collected by Gaujon at or near Zamora (Province of Santiago Zamora), Ecuador (or Department of Amazonas, Peru?), on the eastern Andean slope.

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PLATE II (Enlargements approximate)

Figure 6. *Rhoicinus gaujoni* Simon, genital plaque of female ( $\times 38$ ).

Figure 7. *Rhoicinus andius* Exline, new species, genital plaque of female holotype ( $\times 38$ ).

Figure 8. *Rhoicinus schlingeri* Exline, new species, genital plaque of female holotype ( $\times 38$ ).

Figure 9. *Rhoicinus andinus* Exline, new species, posterodorsal view of genital plaque of female holotype ( $\times 38$ ).

Figure 10. *Rhoicinus rothi* Exline, new species, genital plaque of female holotype ( $\times 38$ ).

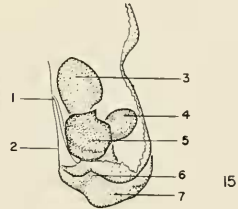
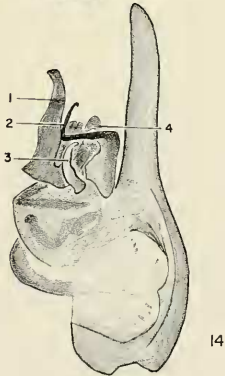
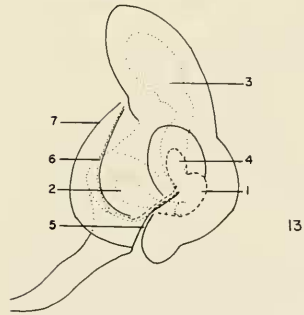
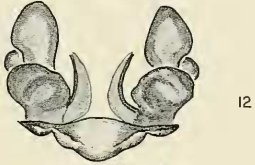
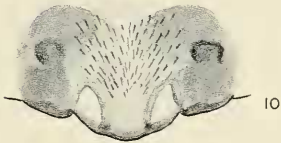
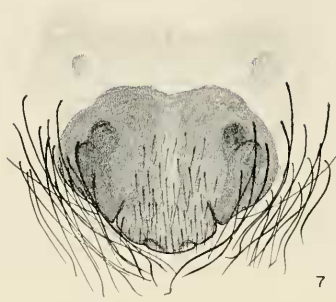
Figure 11. *Rhoicinus weyrauchi* Exline, new species, genital plaque of female holotype ( $\times 38$ ).

Figure 12. *Rhoicinus rothi* Exline, new species, genital plaque of female holotype, dorsal view ( $\times 38$ ).

Figure 13. *Rhoicinus weyrauchi* Exline, new species, left half of genital plaque of female, cleared ( $\times 190$ ), viewed from dorsal side: 1) central spermatheca, 2) ventral spermatheca, 3) anterior spermatheca, on same level as "central," 4) dorsal spermatheca, drained by fertilization duct, 5) external opening into central spermatheca, 6) fertilization duct, 7) slightly sclerotized flange of fertilization duct. (This drawing should have been oriented about 25 degrees in a clockwise direction.)

Figure 14. *Rhoicinus rothi* Exline, new species, palp of male paratype, expanded ( $\times 19$ ): 1) median apophysis, 2) embolus, 3) conductor, 4) terminal apophysis.

Figure 15. *Rhoicinus rothi* Exline, new species, lateral view of left side of genital plaque of female holotype, dissected: 1) lateral view of fertilization duct, 2) ventral wall of vagina, 3) anterior spermatheca, 4) ventral spermatheca, 5) median sclerotized mass, containing one or more chambers or ducts, 6) position of external opening into "5," 7) chitinous band or groove.



**Rhoicinus rothi** Exline, new species.

(Figures 1, 2, 2a, 5, 10, 12, 14, 15.)

FEMALE. Total length, 10.25 mm.; carapace, 5.08 mm. long, 3.56 mm. wide, 1.60 mm. high. Specimen somewhat broken and with much of the hair covering gone; abdomen a little shrunken and spinnerets reeced, probably because the spider had laid eggs.

Carapace light red-brown, pale dorsally, a darker longitudinal band with gray infusions on each side, darkly outlined on margins, and dark brown on sides and front of cephalic region; radiating markings present but not conspicuous. Chelicerae dark reddish-brown, maxillae and lip a little lighter. Legs yellow with only traces of annuli under femora, but probably appearing darker when hair covering all present. Sternum light orange, darker on sides. Abdomen mostly dark gray with many pale dots, with a well marked orange median, longitudinal, dorsal marking, irregular and broken posterior to heart region and not extending onto posterior quarter of abdomen; four pairs of punctae or muscle scars, more or less outlining median stripe, are conspicuous; venter dull gray, genital region reddish, and spinnerets pale orange.

Carapace low, thoracic part wide with rounded sides; head region with parallel sides, very blunt in front, with vertical clypeus, two-thirds as high as area of median eyes. Eyes rather small, all dark, in two somewhat recurved rows, posterior row much wider than anterior; area of median eyes almost rectangular, a little longer than wide. Measurements of eyes: A.M.E., 0.20 mm.; A.L.E., 0.22 mm.; P.M.E., 0.20 mm.; P.L.E., 0.22 mm. Distance between A.M.E., 0.10 mm.; A.M.E. to A.L.E., 0.06 mm.; P.M.E., 0.14 mm.; P.M.E. to P.L.E., 0.30 mm.; A.L.E. to P.L.E., 0.22 mm. Chelicerae only a little genticulate, quite long and slender, with conspicuous boss; fang short and heavy; fang groove with three teeth on each margin, and a heavy fringe of hair bordering anterior margin. Maxillae parallel and only slightly converging over lip; lip large, about equally long and broad, with basal third to fourth of length shallowly notched. Sternum 2.54 mm. long, 1.98 mm. wide, excavated in front for lip, strongly scalloped on sides, and posterior tip narrowing abruptly to extend between fourth coxae.

Legs long and slender, with a covering of fine short hair and very long soft hair that curves toward the tip, and provided with weak pointed spines; trichobothria seemingly normal for group, mostly lost. Second leg longer than first, fourth probably longest. Palp normal, tipped with a toothed claw. Tarsi with upper claws with approximately 10 graduating teeth, distal five fairly stout and conspicuous, basal five small and difficult to see. Lower claw stout, with a long, curved, very fine tooth. A pair of false accessory claws is present. Coxae cylindrical; trochanters rebordered and very strongly notched. Length of legs:



	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	4.70	5.92	4.23	2.16	17.01
2 .....	4.98	5.83	4.23	2.16	17.20
3 .....	4.70	5.26	3.85	1.60	15.41
4 ... ..	5.55	—	—	—	—

Spination of legs: Leg 1. Femur, 9 small, fine spines in approximately three rows dorsally; patella, 3 dorsal (1 midway on each side, and 1 very small distal); tibia, 2 pro- and 2 retrolateral, 4 irregular pairs ventral (all delicate and some almost bristle-like); metatarsus, 2 pro- and 2 retrolateral, 2-2-3 ventral, all stouter than those of tibia. Leg 2, as leg 1. Leg 3. Femur, 10 dorsal; patella, as leg 1; tibia, 2 pro- and 2 retrolaterals, 3 pairs ventral, 1 dorsal about a third length from end of segment. Leg 4. Femur, 8 weak dorsal spines; other segments missing.

Abdomen normal for genus, genital plaque wider than long, conspicuous, probably obscured in living or freshly killed specimens by long converging hairs. Spinnerets and colulus normal; anterior spinnerets stout, no longer than basal segment of posteriors, medians nearly as long; posterior spinnerets with large second segment, laterally compressed, somewhat converging, spinning tubes borne only on inner face.

Genital plaque typical of genus, highly sclerotized, wide, central part with short hairs which cover a wider area, but do not extend as far posteriorly as in other species studied. Posterior edge with a broad median and a pair of lateral scallops, not extending as far behind genital furrow as in *R. gaujoni*. A pair of widely spaced darkened areas about midway marks the position of ventral spermathecae. Posteriorly, two triangular pale areas are outlined by bands of sclerotized chitin, that suggest connecting canals but are not; the bands are connected to the heavily sclerotized mass of inner structures but have no lumen: they continue onto the posterior surface where they may be slightly grooved. Openings are obscurely placed in a deep groove on each side of the posterior surface. If the plaque is removed and turned onto its ventral surface, the inner structures and most of the posterior wall are exposed (see fig. 12). The opening of each side leads into the highly sclerotized mass, which surrounds a complexity of connecting tubes or chambers. There are an anterior and a ventral spermatheca (see fig. 15). The fertilization duct is typical of *Rhoicinus*: a long, narrow tubule, supported by a sickle-shaped flange of thin chitin; the duct empties into the ventral wall of the vagina some distance from the genital groove; the flange with its duct lies just under the ventral vaginal wall (see fig. 12).

MALE. Total length, 11.63 mm. Carapace 4.65 mm. long, 3.44 mm. wide, and 1.95 mm. high. Allotype (fig. 1) in excellent condition except that fourth tarsi are missing. Two paratype males are quite broken.

Carapace light orange-brown, darker on sides and front of head; faint, broad, grayish, lateral stripe on each side of thorax due to covering of short, black hairs; conspicuous brown radiating lines present; area behind eyes covered with short, fine, white hairs and sparsely with long, stiff, black hairs. Chelicerae dark red-brown; legs light orange, with only a trace of gray annulations under femora; palps darker; maxillae, lip, and sternum bright yellowish-brown, sternum paler centrally; abdomen gray with an irregular median yellow stripe with tinges of red; venter almost uniform beige, spinnerets yellow.

Cephalic region blunt in front, with parallel sides, considerably narrower than thoracic region; clypeus vertical, with anterior eyes slightly protruding, slightly more than two-thirds as high as area of median eyes. Chelicerae long, rather slender, and of equal width throughout length, slightly protruding but hardly geniculate, with conspicuous boss; three teeth bordering each margin of fang groove, anterior margin with a thick fringe of long hairs. Thoracic region rounded on sides, moderately arched, highest at anterior end of thoracic groove which is long; cephalic grooves indistinct.

Eyes all dark, small; both rows somewhat recurved as in female. Anterior median eyes appear smaller than others, but measure almost as large as posterior medians. Area of median eyes nearly rectangular, a little longer than wide. Diameters: A.M.E., 0.18 mm.; A.L.E., 0.21 mm.; P.M.E., 0.20 mm.; P.L.E., 0.22 mm. Distance between A.M.E., 0.10 mm.; A.M.E. to A.L.E., 0.08 mm.; P.M.E., 0.14 mm.; P.M.E. to P.L.E., 0.28 mm.; A.L.E. to P.L.E., 0.22 mm. Height of clypeus about 0.50 mm.

Maxillae and lip as in female. Sternum as in female, nine-tenths as wide as long, slightly arched, scalloped on sides, narrowed abruptly behind, separating hind coxae. Coxae long, cylindrical, trochanters widely rebordered and deeply notched.

Legs a little longer than in female, 4123 or 1243, first and second nearly equal in length; heavily clothed with long, soft hairs and armed with rather weak bristle-like spines except for metatarsi. Claws similar to those of female. Length of legs:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	5.49	7.81	6.23	2.88	22.41
2 .....	5.58	7.63	6.32	2.79	22.32
3 .....	5.21	5.77	4.84	2.14	17.96
4 .....	5.77	7.44	5.95	—	—

Spination: Leg 1. Femur, 9-10 weak in three rows dorsally; patella, 1 distal and 1 on each side midway, very weak; tibia, 4 pairs ventral (1 pair basal), 2 pro- and 2 retrolateral; metatarsus, 2-2-3 ventral, 2 pro- and 2 retrolateral. Leg 2. As leg 1. Leg 3. As leg 1 except tibia, 3 pairs ventral, 2

pro- and 2 retrolateral, 1 midway dorsal; metatarsus, 2-2-3 ventral, 3 pro- and 3 retrolateral. Leg 4. Same as leg 3.

Palp described under "Genitalia" above (see figs. 2, 2a, 5, 14).

Abdomen rather slender, spinnerets and anal tuberele as in female.

LOCALITY DATA. Holotype female, allotype male, and 2 male paratypes—Peru (San Martín): Hara, 20 miles S.E. of Moyobamba, collected June 1-30, 1947, by Felix Woytkowski.

DISPOSITION OF TYPES. The holotype female and the allotype male are the property of the American Museum of Natural History. One paratype male is deposited with the California Academy of Sciences, and another in my collection.

REMARKS. The species is separated from other *Rhoicinus* on characters of the female, as males are unknown for the other species. Definitive characters are shown in the key to species.

The species is named for Vincent D. Roth, Yuma, Arizona.

***Rhoicinus schlingeri* Exline, new species.**

(Figure 8.)

FEMALE. Total length, 9.11 mm.; carapace 3.72 mm. long, 2.79 mm. wide, 1.12 mm. high. Carapace reddish brown, a little paler in midline and on sides, radiating markings present but inconspicuous; chelicerae dark reddish-brown; legs yellowish infused with gray, definite and regular gray annuli on femora and very faint ones on patellae and tibiae; abdomen gray with yellowish punctae, a broad yellow marking over heart region followed by a median, yellowish longitudinal band broken by gray. Maxillae and lip reddish brown; sternum yellow brown, darker toward edges; venter of abdomen and spinnerets yellow.

Head region broad, blunt in front, sides parallel; cephalic grooves shallow, thoracic groove long and deep; thoracic region gently rounded on sides. Chelicerae normal, slightly geniculate near base, somewhat depressed under base, with corrugated exoskeleton, boss large; fang heavy, with three teeth on each margin of furrow.

Clypeus low, about half height of median eye area, a little higher than in *R. andinus*. Eyes about as in other species, both rows recurved, all dark; anterior median eyes only slightly smaller than others, separated by three-fourths of a diameter; posterior median eyes separated by a diameter; median ocular area almost as broad as long, somewhat narrowed in front.

Maxillae straight ectally as in *R. andinus*; lip a little longer than broad, with basal third shallowly notched; sternum large, round, wider than in other species, almost as wide as long, only a little concave in front, somewhat

scalloped on sides, produced to blunt point behind. Trochanters deeply notched.

Legs hairy as in other species; spines partially replaced by bristles, and many of the spines, especially those under tibiae, bristle-like at tips. Claws as in other species; first leg with nine teeth on upper claws; lower claw with one very fine, long, recurved tooth. Legs 4123. Length of legs:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	3.16	4.00	2.88	1.49	11.53
2 .....	3.16	3.91	2.70	1.58	11.35
3 .....	3.07	3.53	2.51	1.40	10.51
4 .....	3.35	4.46	3.81	1.58	13.20

Spination of legs: Leg 1. Femur, 9 scattered dorsal, bristle-like; patella, distal bristle and 1 feeble spine on each side of middle; tibia, 2-2-0 weak ventral, 2 pro- and 2 retrolateral; metatarsus, 2-2-3 ventral, 2 pro- and 2 retrolateral (well developed). Leg 2. Femur and patella as leg 1; tibia, 2 bristles-2-1 bristle and 1 feeble spine ventrally, 2 pro- and 2 retrolateral, 1 dorsal bristle; metatarsus as leg 1. Leg 3. Femur and patella as leg 1; tibia, 1-2-2 ventral, 2 pro- and 2 retrolateral, 1 weak dorsal; metatarsus as leg 1. Leg 4. Femur, 7 bristle-like spines dorsal; patella as leg 1; tibia, 1-2-2 (all bristle-like) ventral, 2 pro- and 2 retrolateral, 1 weak dorsal; metatarsus as leg 1.

The pedicel has the anterior piece of the lorum with a very deep, rounded notch, into which the projection of the posterior piece fits, as in *Dolomedes*.

Genital plaque (fig. 8) red, bluntly triangular with apex behind, outlined behind with black, heavily sclerotized chitin, more arched than in other species, midline somewhat depressed; posteriorly projecting considerably beyond genital groove, with brush of long hairs on each side and band in midline clothed with short hairs; a pair of bands of light chitin are faintly discernible posteriorly, and lateral to each is a deep notch in the posterior wall, which is reflected on the posterodorsal wall as a groove leading to the external openings. A pair of ventral spermathecae are visible as two dark patches, not so far apart as in most species. Internally, the spermathecal complexes are not so distant from one another as in other species; anterior spermathecae considerably anterior to the ventrals as in *R. weyrauchi*, and slightly elongate and somewhat tipped toward one another; the general structure appears the same as in *R. rothi*, *R. andinus*, and *R. weyrauchi*. The sickle-shaped flange of the fertilization duct is narrower than in the other species, but the duct itself is wider, sclerotized, and clearly visible.

The spiracular furrow appears to be a little distance anterior to the spinnerets. Colulus as in other species. Spinnerets robust; anterior pair not quite contiguous, short; medians contiguous, slender, about as long as anteriors; posteriors widely separated, longer than in other species, the basal

segment is longer than the anterior pair, and the distal segment is well developed and conspicuous. Anal tubercle as in other *Rhoicinus*.

LOCALITY DATA. Holotype female—Peru (Huanuco): 43 mi. east of Tingo Maria, collected October 5, 1954, by E. I. Schlinger and E. S. Ross.

REMARKS. As only the holotype female is known, there are no data on variability. *Rhoicinus schlinger* lives in the same general area as *R. andinus*, and has many features, including size, in common. It is here considered a distinct species, separated by the following characters: wider sternum, higher clypeus, longer posterior spinnerets, and differences in appearance and structure of genital plaque.

The species is named for one of the collectors, E. I. Schlinger.

### **Rhoicinus andinus** Exline, new species.

(Figures 3, 7, 9.)

FEMALE. Total length 11.16 mm.; carapace, 4.19 mm. long, 3.07 mm. wide, 1.12 mm. high (paratypes a little shorter). Carapace light brown, darker on sides and front of head; indistinct pair of wide, longitudinal bands and conspicuous radiating lines on thorax. Chelicerae dark reddish-brown; legs yellowish with gray annulations on ventral side of femora (paratypes have tibiae also annulate). Maxillae and lip light reddish-brown; sternum yellow, darker toward edges; coxae pale yellow. Abdomen irregularly grayish, with soft prone hairs and longer, more erect hairs, with a pale irregular longitudinal marking, formed of coalescing chevrons, in the median dorsal area. Venter with a pale median longitudinal stripe; spinnerets yellowish.

Chelicerae rather slender, only slightly geniculate, protruding, with large boss; three teeth on each margin of fang groove; fang short and heavy. (A paratype has four teeth on ventral margin of fang groove of one chelicera). Carapace low, evenly rounded on sides, with thoracic region considerably wider than cephalic, which has nearly parallel sides that slightly taper anteriorly; cephalic furrows indistinct; thoracic groove long and deep. Pedicel as in *Dolomedes*, though not so strongly notched.

Clypeus less than half the height of median eye area. Eyes in two curved rows, anterior row much shorter than posterior; median ocular area somewhat longer than wide, a very little narrower in front than behind; median eyes of both rows separated by about a diameter; anterior median eyes slightly smaller than others; lateral eyes well separated, each on a separate, very low tubercle.

Lip a little longer than broad, blunt in front, sides straight but narrowing anteriorly, basal third deeply notched on each side. Maxillae with parallel lateral sides, inner sides inclined to median line but not curved over

lip. Sternum almost flat, concave in front, sides not so undulated as in *R. gaujoni*, and posteriorly narrowed more gradually to a blunt point.

Legs moderately long, conspicuously covered with long, soft hair that is curved at tips, short hairs, and slender spines. Trichobothria as on other species, but a few very long. Tarsi as in other species, upper claws with 9-14 teeth, median claw with one fairly long tooth (leg 3 of paratype, 10 teeth on upper claws, median claw with one very long, thin, recurved tooth). Legs of both holotype and paratypes 4213. Length of legs of holotype:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	3.53	4.65	3.35	1.77	13.30
2 .....	3.81	4.74	3.35	1.63	13.53
3 .....	3.72	4.09	2.98	1.30	12.09
4 .....	4.19	5.02	4.19	1.86	15.26

Spinination of legs: Leg 1. Femur, 1 prolateral, 7 weak, scattered, dorsal; patella, 1 weak prolateral, 1 basal, 1 distal, 1 retrolateral bristle; tibia, 1-2-2 ventral and 2 basal bristles; 2 pro- and 2 retrolateral (all short and weak); metatarsus, 2-2-3 ventral, 2 pro- and 2 retrolateral (stronger than those on other segments). Leg 2. Femur, 3 spine-like bristles in midline, others scattered; patella as of leg 1; tibia, 1-1-2 bristle-like ventral, 2 pro- and 2 retrolateral; metatarsus, as leg 1. Leg 3. Femur with about 10 bristle-like, dorsal; patella, as leg 1; tibia, 1-2-2 bristle-like, 1 pro- and 2 retrolateral, 1 dorsal; metatarsus, 2-2-3 ventral, 3 pro- and 3 retrolateral. Leg 4. Femur, 8 scattered, bristle-like, dorsal; patella, as leg 1; tibia, as leg 3; metatarsus, 2-2-3 ventral, staggered, 2 pro- and 3 retrolateral.

Abdomen fairly large, as in other species. Colulus large; anterior spinnerets almost contiguous, robust; median pair slender, nearly as long as anterior; posteriors almost as robust as anteriors, longer, with distinct second segment (see fig. 3). Anal tubercle as in *R. gaujoni*.

Genital plaque (figs. 7, 9) heavily sclerotized, with broad posterior margin, evenly curved, interrupted by a pair of slits; pale areas invisible in holotype but conspicuous in paratypes, just median to slits, small and bordered by sclerotized bands of chitin. Very long curved hairs on sides; short hairs cover median area to posterior edge. A pair of darkened areas, marking position of ventral spermathecae, somewhat nearer each other than in *R. gaujoni* or *R. rothi*. Openings on postero-dorsal surface. Structure much like *R. rothi*, but anterior spermathecae round and very little anterior to ventral spermathecae; flanges of fertilization duct typical, slightly more than a diameter apart, rather short.

REMARKS. The almost evenly curved posterior margin of the genital plaque and low clypeus separate *R. andinus* from *R. gaujoni*, *R. wallsi*, *R. schlingeri*, and *R. rothi*, to all of which it is closely related.

LOCALITY DATA. Holotype and one paratype (female)—Peru (Huanuco-San Martín): Manson Valley, near Tingo Maria, collected December 2, 1954, by E. I. Schlinger and E. S. Ross (California Academy of Sciences). Paratype female—Peru (Huanuco): Divisoria, 1400 m. above sea level in Cordillera Azul, collected by Prof. Dr. W. K. Weyrauch (American Museum of Natural History).

**Rhoicinus weyrauchi** Exline, new species.

(Figures 11, 13.)

FEMALE. Total length, 4.93 mm. Carapace 2.23 mm. long, 1.67 mm. wide, 0.98 mm. high. Carapace with cephalic part and chelicerae chestnut brown, thoracic part infused with lighter patches and dark radiating markings. Legs brownish yellow, with dark gray annuli on all segments except tarsi, conspicuous ventrally but somewhat obscure dorsally. Maxillae and lip dark, sternum yellowish but darker opposite coxae; coxae yellow. Abdomen dark gray, with yellow marking over heart region and two pairs of yellow patches behind, followed by a single one; sides also with irregular yellow patches; venter nearly all yellowish; spinnerets same infused with gray.

Chelicerae moderate in size, almost straight, with large boss; fang short and heavy, three teeth bordering each margin of fang groove. Cephalic region blunt in front, with parallel sides, rather high; thoracic part evenly rounded on sides; cephalic grooves distinct; thoracic groove small and short.

Eyes much as in other species, all dark, about equal in size, in two somewhat recurved rows. Median ocular area rectangular, longer than wide, both anterior and posterior median eyes separated by only a radius. Lateral eyes separated by a diameter; posterior median eyes separated by more than a diameter from posterior lateral eyes. Clypeus perpendicular, not quite half as high as median ocular area.

Lip about equally broad and long, very shallowly notched on each side of basal third; maxillae normal, almost meeting over lip; sternum large, concave in front, scalloped on sides, tapering gradually to blunt point behind, completely separating hind coxae; surface of sternum rounded rather than flat.

Legs with cylindrical coxae; trochanters deeply notched; legs without long curved hairs found in other species (possibly lost, as trichobothria also are mostly missing). Spines stouter and longer than in *R. andinus* or *R. schlingerii*, and far fewer of them are reduced to bristles. Upper claws of second leg with 12 teeth, lower claw with one long tooth; pair of false accessory claws present. Legs, 4213; length:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	2.23	2.51	1.67	1.12	7.53
2 .....	2.33	2.50	1.77	1.21	7.81
3 .....	1.95	2.14	1.67	0.93	6.69
4 .....	2.51	3.07	2.51	1.26	9.35

Spination of legs: Many of the spines have been lost; both holotype and paratype have been examined to compile the following data. Leg 1. Femur, 6 to 8 scattered dorsally; patella, 1 on each side of middle; tibia, 3 pairs ventral, well developed, 2 pro- and 2 retrolateral; metatarsus, 2-2-3 ventral, 2 pro- and 2 retrolateral. Leg 2. Femur, approximately 10 scattered dorsally; patella, tibia, and metatarsus as leg 1. Leg 3. Femur, 8 scattered dorsally; patella, as leg 1; tibia, 1-2-1 ventral (1 distal replaced by bristle), 2 pro- and 2 retrolateral, 1 dorsal; metatarsus, 2-2-3 ventral, 3 pro- and 3 retrolateral. Leg 4. Femur, 4 scattered dorsally; patella as leg 1, probably with 1 distal; tibia, 1-2-2 ventral, 2 pro- and 2 retrolateral, 1 dorsal; metatarsus as leg 3.

Spinnerets stout, proportionally not so long as in other species but otherwise similar, with posteriors a little longer than anterior pair; colulus and anal tubercle similar. Spiracular furrow some distance anterior to spinnerets.

Genital plaque (fig. 11) wider than long, not so heavily sclerotized as in other species, blunt behind and extending very slightly behind genital furrow. Openings on posterodorsal surface as in other *Rhoicinus*; internal structure more completely visible through exterior chitin than in other species, ventral spermathecae show through as darkest objects, anteriors lighter; the structures of each half widely separated. The internal structures (fig. 13) are discussed under "Genitalia," above.

LOCALITY DATA. Holotype and paratype females—Peru (Junin): Chanchamayo Valley, 800 m. altitude, collected February 7, 1953, by W. K. Weyrauch. The paratype will be deposited in the collection of Prof. Dr. Weyrauch, Lima, Peru, for whom the species is named. The holotype is to be deposited at the California Academy of Sciences.

REMARKS. *Rhoicinus weyrauchi* is the smallest species of *Rhoicinus* known. Its genital plaque differs from the others in being considerably wider than long and not heavily sclerotized, with the structures of the two sides very far apart, and the posterior edge blunt and not extending beyond the genital groove. *Rhoicinus waplerei* Simon, a small species from Venezuela, is similar to *R. weyrauchi*, judging from Simon's brief description; type specimens from Simon's collection, or topotype material from Venezuela, would have to be compared with *R. weyrauchi* to determine the degree of affinity.



Genus **Calacadia** Exline, new genus.

TYPE SPECIES. *Calacadia chilensis* Exline, new species.

Carapace fairly high, cephalic part broad, blunt in front, with nearly parallel sides; thoracic part not much wider than cephalic; longitudinal thoracic groove present, cephalic grooves poorly developed.

Eyes in two nearly straight rows, anterior row somewhat procurved, short, with medians smaller than laterals, all about equally spaced; posterior row similar in size, about equally spaced, and a little recurved, procurved, or straight; all dark. Clypeus very narrow, usually not as high as diameter of anterior median eyes.

Chelicerae heavy, geniculate, with large boss; fang groove inconspicuous, usually armed with three teeth above, most medial of which extends as a sclerotized ridge half length of chelicera, and two small teeth near fang below. Lip about equally wide and long, with basal fourth or fifth excavated; maxillae parallel, somewhat overlapping above lip, with inner tip scopulate. Sternum almost flat, blunt in front, and attenuated between hind coxae posteriorly.

Legs of moderate length, spiny; trochanters all rebordered distally and notched conspicuously (weakly in *C. osorno*); three to five pairs of spines under tibia 1, distal pair weak, second and third pairs usually overlapping. Patellae unarmed except for a short distal bristle. Two rows of trichobothria on tibiae, metatarsi, and tarsi. Distal tip of posterior four metatarsi with stiffened, denticulate hairs. Tarsi with three claws, upper claws armed with 7-13 teeth, usually 7-9, median claw with 1-3 very fine teeth that are seen only with high magnification. Males with more teeth on upper claws than females.

Pedicle as in *Rhoicinus*; abdomen ovoid, without plumose hairs; spiracle somewhat anterior to spinnerets; six spinnerets, preceded by a very large colulus, anteriors nearly contiguous, short and robust, with very short apical segment, medians contiguous, shorter than either anteriors or posteriors; posterior pair farther apart than anterior, but not extending farther laterally, much more slender and a little longer or shorter, provided with a small second segment, the tip of which bears 12-14 spinning tubules. Anal tubercle two-segmented.

The genitalia of *Calacadia* are complex but uniform in general construction, showing a close relationship between species (see above, "Genitalia," and figs. 25-36).

REMARKS. The new species of *Calacadia* are fairly easy to separate; previously described species, although placed in *Calacadia* with confidence, were not described in sufficient detail to separate them in the key, nor even to identify any of the recent material with them. Therefore some of the present names may be synonyms of previously named species; *C. dentifera* (Tull-

gren) may be a synonym of *C. ambigua* (Nicolet), and the supposed male and female of *C. radulifera* (Simon) may not be conspecific.

KEY TO FEMALES OF CALACADIA

1. Five pairs of ventral tibial spines; genital ridges over half length of genital plaque ..... 2  
 Less than five pairs of spines under anterior tibiae; genital ridges short, half length of plaque or less..... 3
2. Surface of genital plaque rounded; ridges long and considerably arched toward one another; spermathecae contiguous and rounded anteriorly; fertilization canal large, but not coiled.....*C. chilensis* Exline, new species  
 Surface of genital plaque flat; ridges long and only slightly arched; spermathecae long, narrow, contiguous throughout length; fertilization canal longer, narrower, and much coiled.....*C. rossi* Exline, new species
3. Four pairs of spines under tibiae 1; genital ridges very short; spermathecae well separated, small, elongate, and narrow.....*C. coquimbensis* Exline, new species  
 Three pairs of spines under tibiae 1; genital ridges raised above vaulted groove; spermathecae contiguous with coiled fertilization canal.....  
 .....*C. osorno* Exline, new species

**Calacadia chilensis** Exline, new species.

(Figures 16, 22, 23, 25, 26, 28, 30.)

FEMALE. Length 5.5 to 10.0 mm. Carapace yellow to burnt orange, streaked with irregular gray markings; legs similar but a little lighter, irregularly annulated with gray, usually with two to three annulations under femora; abdomen pale, mottled with dark gray and with an indistinct longitudinal band outlined with light and dark markings (fig. 16). Body covered with hair, but none plumose.

PLATE III (Enlargements approximate)

Figure 16. *Calacadia chilensis* Exline, new species, pattern of abdomen, holotype female ( $\times 8$ ).

Figure 17. *Calacadia coquimbensis* Exline, new species, pattern of abdomen, holotype female ( $\times 8$ ).

Figure 18. *Calacadia osorno* Exline, new species, dorsal view of body ( $\times 8$ ).

Figure 19. *Calacadia rossi* Exline, new species, ventral view of body ( $\times 8$ ).

Figure 20. *Calacadia rossi* Exline, new species, dorsal view of body ( $\times 8$ ).

Figure 21. *Calacadia rossi* Exline, new species, modified hair from tip of leg 3.

Figure 22. *Calacadia chilensis* Exline, new species, spinnerets and colulus ( $\times 19$ ).

Figure 23. *Calacadia chilensis* Exline, new species, tibia, metatarsus, and tarsus of leg 1 ( $\times 8$ ).

Figure 24. *Calacadia rossi* Exline, new species, claws of leg 3, showing teeth on upper and lower claw, the false accessory claw, and a few hairs.



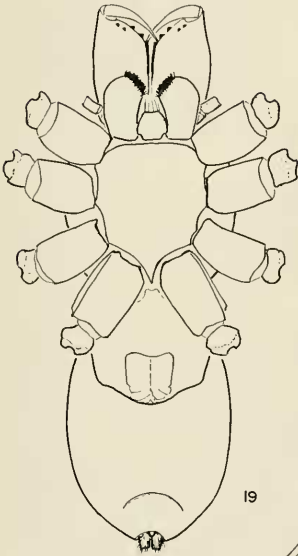
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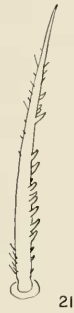
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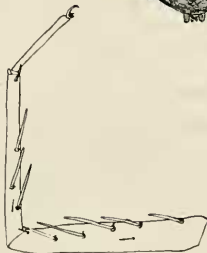
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Carapace high, highest in posterior part of cephalic region, with gently rounded sides; cephalic region almost as wide as thoracic and blunt in front, with sides parallel. Chelicerae heavy, geniculate, nearly triangular in lateral view, protruding anteriorly well beyond carapace, boss conspicuous; fang long, with inconspicuous groove, two small teeth near base of fang, articulating with fang rather than on posterior edge of groove, three larger teeth anterior to fang groove, with the most distal from fang attenuated as a sclerotized ridge extending to base of chelicerae; anterior edge of groove bordered with a fringe of long hairs.

Eyes all dark, posterior row considerably longer than anterior, and straight or slightly procurved or recurved, equidistant and equal in size, anterior row procurved and equidistant, anterior median eyes smaller than others. Median ocular area nearly as long as wide, but greatly narrowed in front; lateral eyes separated by less than a radius. Clypeus three-fourths diameter of anterior median eyes.

Maxillae of moderate length, almost parallel on sides, slightly inclined over labium, heavily scopulate on inner margin of apex. Labium as broad as long, basal one-fifth excavated, anterior to which is broadest part, rounded on sides to the blunt anterior margin. Sternum broad and almost flat, a little longer than broad (5:4), nearly straight in front, with slightly sinuous parallel sides, narrowing evenly from third coxae to fourth, with narrowly pointed tip separating fourth coxae; sparsely clothed with long, black, erect hairs and shorter, inclined hairs. Coxae large, cylindrical; all trochanters notched.

Legs moderate in length and thickness (fig. 23), 4123, with many spines and several types of hair, with trichobothria in irregular double rows on tibiae, metatarsi, and tarsi; 4-5 pairs of spines under tibia 1, typically five pairs, with distal pair weak and one weak prolateral and one weak retrolateral spine; distal pair sometimes not developed, and in one specimen pro- and retrolateral spines lacking; second and third pairs of spines usually somewhat overlapping, and fourth pair more widely separated than others. Tarsi with three claws, upper claws long and similar, pectinate with 7-9 teeth; third claw small, usually with two very small, slender teeth near base, the proximal one of which may be reduced to a denticle. A pair of unsertated accessory spines is present. Hairs on tarsi dense, especially underneath, but not forming scopulae; hairs on distal half of metatarsi, especially posterior pairs, stiff and slightly modified with irregular denticles. Palp with a long pectinate claw.

Pediceal as in *Rhoicinus*, but very shallowly notched.

Genital plaque large, dark, heavily sclerotized, with surface rounded behind middle and obscured by hair. Externally with a pair of long sclerotized ridges facing one another like a pair of parentheses, separated by nearly the width of the plaque. Deep narrow grooves lie under and along

the medial sides of ridges, connected anteriorly by a shallow, wide groove in anterior part of plaque (fig. 28). Grooves end posteriorly in openings to internal structures, difficult to see. Sclerotized points may terminate ridges posteriorly, or points may be absent, or may be separate and posterior to ridges. In specimens not too heavily sclerotized, several internal structures may be partly discernible. Anteriorly, a darkened pair of structures that outline plaque, are parts of the copulatory canals; between these and the large pair of median rounded spermathecae, a pair of connecting tubes may be visible. Posterior to and between tips of spermathecae, which turn outward posteriorly where connecting canals enter them, lies a pair of fertilization canals. If lip of plaque is raised, these are clearly seen as large chambers bent dorsally. Internal structures are described under "Genitalia," above (see also fig. 30).

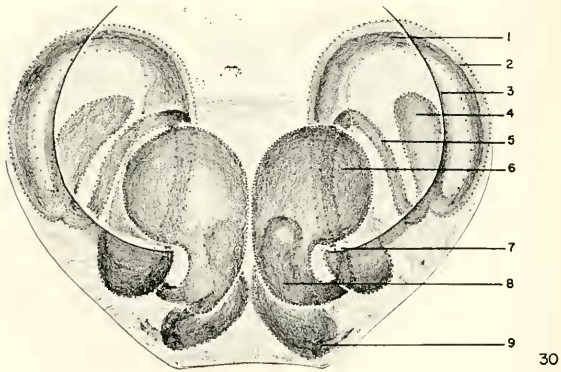
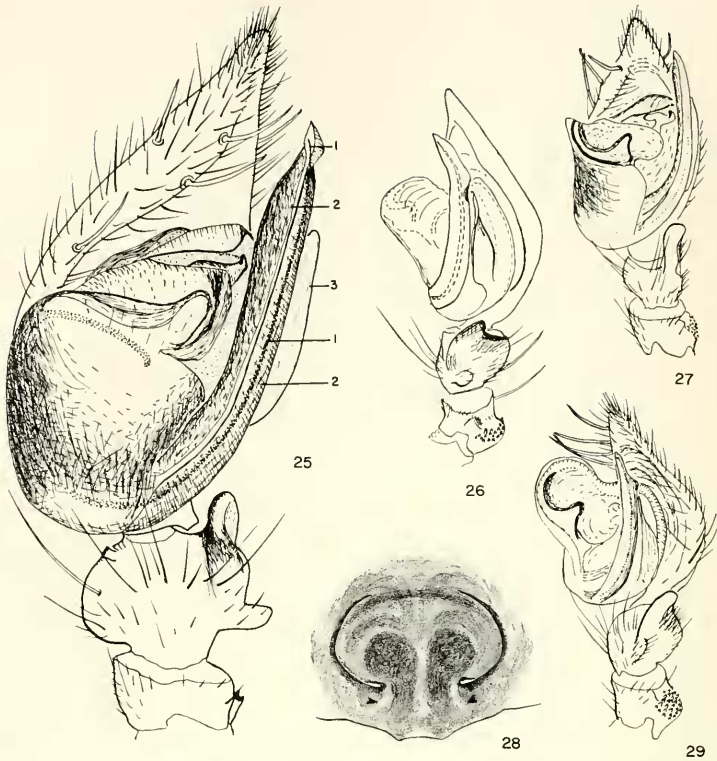
Spiracular opening a short distance anterior to spinnerets. Anterior spinnerets moderate in size, cylindrical, almost contiguous, preceded by a very large rounded colulus; median spinnerets normal; posterior spinnerets more slender than anterior, but usually a little longer, with a short second segment, tip of which bears about 14 spinning tubules (fig. 22). (In some specimens the posterior spinnerets are somewhat reeced, and appear shorter than anterior pair.) The posterior spinnerets are well separated, but not extending laterally as far as anterior pair. Anal tubercle moderate in size, with two segments.

MEASUREMENTS AND DETAILS OF HOLOTYPE. Total length, 8.88 mm.; carapace, 4.30 mm. long, 2.99 mm. wide, 1.68 mm. high. Eyes: diameter of A.M.E., 0.16 mm.; A.L.E., 0.24 mm. P.M.E., 0.20 mm.; P.L.E., 0.22 mm. Distance between A.M.E., 0.08 mm.; A.M.E. and A.L.E., 0.08 mm.; P.M.E., 0.24 mm.; P.M.E. and P.L.E., 0.22 mm.; A.L.E. and P.L.E., 0.08 mm. Height of clypeus at level of A.L.E., 0.12 mm.

Measurements of legs:

	Femur	Pat.-tibia	Meta-tarsus	Tarsus	Total
1 .....	3.10	4.04	2.63	1.13	10.90
2 .....	2.71	3.46	2.06	1.03	9.26
3 .....	2.63	2.81	2.43	0.94	8.81
4 .....	3.27	4.30	3.37	1.21	12.15

Spination of legs: Leg 1. Femur, 1 prolateral, 6 dorsal (3 weak in median line); tibia, 5 pairs ventral, 2 pro- and 1 retrolateral (or 6 pairs ventral and 1 prolateral); metatarsus, 3 pairs ventral, 3 pro- and 2 retrolateral. Leg 2. Femur, 7 dorsal (3 in midline, 1 on each side basal, 1 on each side distal); tibia, 4 pairs ventral, 2 pro- and 1 retrolateral; metatarsus, 3 pairs ventral and 1 median distal, 3 pro- and 2 retrolateral. Leg 3. Femur, same as leg 2; tibia, 2 dorsal, 3 pairs ventral, 2 pro- and 2 retrolateral; metatarsus, 2-2-3



ventral, 3 pro- and 3 retrolateral, 1 dorsal. Leg 4. Femur, 6 dorsal; tibia, 2 dorsal, 1-1-2 ventral, 2 pro- and 2 retrolateral; metatarsus, 3 dorsal, 3 pro- and 3 retrolateral, 1-1-2 ventral.

MALE. Total length, 8.4 mm.; carapace, 3.9 mm. long, 2.8 mm. wide, 1.5 mm. high. Quite similar to female, although legs are longer in proportion to body, and chelicerae not so robust nor protruding so far in front of carapace; abdominal pattern as in female. Cheliceral teeth, fang, maxillae, lip, and sternum as in female. Eyes dark, posterior row straight although appearing slightly procurved. Diameters of eyes: A.M.E., 0.12 mm.; A.L.E., 0.16 mm.; P.M.E., 0.16 mm.; P.L.E., 0.16 mm. Distance between A.M.E., 0.10 mm.; A.M.E. and A.L.E., 0.10 mm.; P.M.E., 0.22 mm.; P.M.E. and P.L.E., 0.22 mm.; A.M.E. and P.M.E., 0.24 mm.; A.L.E. and P.L.E., 0.14 mm.

Legs with trochanters rebordered and notched as in female, trichobothria in double rows on tibiae, metatarsi, and tarsi, but a few trichobothria on metatarsi are unusually long (twice as long as segment is thick). Tarsi more thickly clothed with short unmodified hairs; a few slightly dentate hairs on tip of metatarsi. Claws with many more teeth than in female, 14 on upper claw of leg 2, three very small on lower claw. Length of legs:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 . . . . .	3.16	4.19	2.70	1.40	11.45
2 . . . . .	3.07	3.72	2.70	1.21	10.70
3 . . . . .	2.79	3.44	2.88	1.12	10.23
4 . . . . .	3.44	4.37	3.81	1.40	13.02

PLATE IV (Enlargements approximate)

Figure 25. *Calacadia chilensis* Exline, new species, palp of male allotype, ventral view (× 38): 1) embolus, 2) terminal apophysis or "fulcrum," 3) conductor.

Figure 26. *Calacadia chilensis* Exline, new species, palp of male allotype, lateral view (× 19).

Figure 27. *Calacadia coquimbensis* Exline, new species, palp of male allotype, ventral view (× 19).

Figure 28. *Calacadia chilensis* Exline, new species, genital plaque of female holotype (× 38).

Figure 29. *Calacadia coquimbensis* Exline, new species, palp of male allotype, lateral view (× 19).

Figure 30. *Calacadia chilensis* Exline, new species, genital plaque of female, cleared (× 76): 1) lumen of copulatory canal, 2) copulatory canal, 3) external or copulatory ridge, 4) diverticulum, 5) connecting canal (between diverticulum and spermatheca), 6) spermatheca, 7) external opening into copulatory canal, 8) fertilization canal (dorsal to posterior part of spermatheca, 9) fertilization duct (emptying into ventral wall of vagina).

Spination of legs: Leg 1. Femur, 6 small dorsal, 1 prolateral; patella, 1 basal, 1 distal very weak dorsal; tibia, 1 weak basal dorsal, 1 pro- and 1 retrolateral, 5 pairs ventral (not so long as in female); metatarsus, 1 dorsal, 2 pro- and 2 retrolateral, 4 pairs ventral with 1 distal median. Leg 2. Femur, 6 very weak dorsal; patella, 1 distal spine or bristle; tibia, 2 very weak dorsal, 1 pro- and 1 retrolateral, 5 pairs ventral; metatarsus, 3 dorsal, 1 pro- and 1 retrolateral, 3 pairs and 1 median distal ventral. Leg 3. Femur, 7 dorsal; patella, 1 basal and 1 distal, weak; tibia, 2 dorsal, 2 pro- and 2 retrolateral, 3 pairs ventral with distal pair stronger than others; metatarsus, 1 basal dorsal, 3 pro- and 3 retrolateral, 3 pairs ventral with 1 median distal. Leg 4. Femur, 6 dorsal; patella, 1 weak basal and 1 distal bristle; tibia, 2 dorsal, 3 retro- and 2 prolateral, 3 pairs weak ventral; metatarsus, 2 dorsal, 3 pro- and 3 retrolateral, 3 pairs and 1 median distal ventral.

Anterior pair of spinnerets robust, short, not quite contiguous, preceded by large tongue-shaped colulus as in female; posterior pair very slender, shorter than in female, farther apart than anterior pair, with distinct but small apical segment.

For a general discussion of the palp, see above under "Genitalia" (figs. 25, 26). The patella and tibia are short and equal in length. The patella is armed retrolaterally with a short, basal protuberance bearing many equally short, stout teeth on its sloping anterior surface; on its retrolateral side the tibia bears a short, fleshy, finger-like, basal process, and a distal, blunt, chitinous process distally that extends beyond the segment, and is slightly keeled ventrally. The tarsal cymbium is large and elongate. The visible part of the bulb is mostly tegulum, with a hooked median apophysis in the anterior median part, and the large terminal apophysis and embolus arising from the basal retrolateral side of the tegulum. The terminal apophysis surrounds the embolus except at its tip, and both extend anteriorly beyond the bulb. The conductor is almost membranous, arising from the retrolateral side of the tegulum, anterior to the terminal apophysis and embolus.

Specimens of *C. chilensis* are somewhat variable. One small female has only four pairs of spines on the ventral side of the tibia. The female genital plaque is subject to more variability than that accounted for by age and degree of sclerotization. The copulatory canals are contiguous anteriorly in some females; in others, including the holotype, they are widely separated. The anterior extent of the copulatory canals differs also. The diameter and length of the connecting canals are not the same in all specimens: in one female these make no anterior loop, but pass directly from the diverticulum to the posterolateral opening into the spermathecae.

*Calacadia chilensis* is obviously distinct from the other new species, although all are closely related. It may, however, be a synonym of *C. ambigua* (Nicolet), for which there is no adequate description. *C. dentifera* (Tullgren) differs in details of the male palp, and *C. radulifera* (Simon) seem-



ingly is armed with three teeth on the lower margin of the cheliceral fang groove, and lacks the basal apophysis on the palpal tibia of the male.

LOCALITY DATA. Holotype female and three female paratypes—Chile (Osorno): Valley Forest, 18 km. west of Purranque, collected January 16, 1951. Four female paratypes—(Osorno): 10 km. east of Puyehue, January 24, 1951. Allotype male—(Osorno): 20 km. east of Puyehue, January 24, 1951. Female paratype (small, with only four spines on ventral side of tibia 1)—(Arauco): Nahuelbuta, Crest of Sierra (1200 m. elevation), west of Angol, January 23, 1951. Female paratype (with genital plaque with short connecting tubes)—(Cautín): 20 km. east of Témuco, January 17, 1951. These specimens were all collected by Drs. E. S. Ross and A. E. Michelbacher.

DISPOSITION OF TYPES. Holotype female, male allotype, and paratype females in California Academy of Sciences Collection; one paratype female in the Muséum National d'Histoire Naturelle, Paris; one in the collection of the American Museum of Natural History; one in the collection of the British Museum (Natural History); one in the Museum of Comparative Zoology (Cambridge); and two in my collection.

**Calacadia coquimbensis** Exline, new species.

(Figures 17, 27, 29, 33, 34.)

FEMALE. Total length, 11.5 mm.; carapace, 4.8 mm. long, 3.1 mm. wide, 2.0 mm. high. Body longer and more slender than *C. chilensis* or *C. rossi* and with fewer and shorter spines on legs. Carapace chestnut brown with irregular gray markings; chelicerae shiny, darker; femora and patellae like carapace, annulate with gray; tibiae and metatarsi dark chestnut, tarsi lighter. Abdomen gray, with irregular darker markings, and median longitudinal stripe enclosing five pairs of light chevron-shaped spots (fig. 17). Sternum shiny light brown; venter of abdomen dove gray with genital plaque and spinnerets brown.

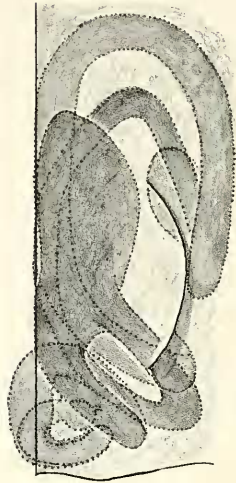
Chelicerae protruding in front of carapace farther than in *C. chilensis*, otherwise similar in structure. Carapace with thoracic region not much wider than cephalic, slightly rounded with undulating margins.

Eyes all dark, posterior row straight. Diameters of eyes: A.M.E., 0.14 mm.; A.L.E., 0.20 mm.; P.M.E., 0.20 mm.; P.L.E., 0.22 mm. Distance between A.M.E., 0.10 mm.; A.M.E. and A.L.E., 0.10 mm.; P.M.E., 0.22 mm.; P.M.E. and P.L.E., 0.20 mm.; A.L.E. and P.L.E., 0.16 mm.; P.M.E. and A.M.E., 0.20 mm. Anterior median eyes smaller than others, anterior row almost equally spaced. Posterior eyes about equal in size and equally spaced; quadrangle formed by median eyes is a little wider behind than long.

Maxillae as in *C. chilensis*; lip about equally long and wide with basal



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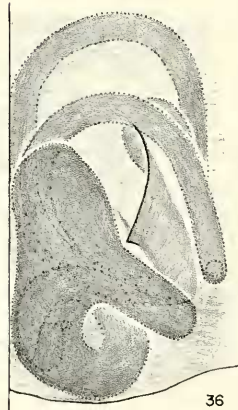
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fourth notched. Sternum slightly convex, ovoid but blunt in front and attenuated behind, separating hind coxae as in other species.

Legs similar to *C. chilensis*, with trochanters obviously notched; modified hairs toward tip of metatarsi, especially on 3 and 4, with regular rows of very sharp denticles; claws of leg 3 with 7-8 teeth, lower claw smooth. Trichobothria as in *C. chilensis*; spines of legs shorter and fewer in number, only 4 pairs under tibia 1. Measurements of legs:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	2.70	3.44	2.23	1.12	9.49
2 .....	2.60	3.16	1.95	1.02	8.73
3 .....	2.51	3.07	2.05	0.93	8.56
4 .....	3.07	4.19	3.53	1.30	12.09

Spinination of legs: Leg 1. Femur, 3 dorsals, 1 prolateral; tibia, 4 pairs ventral, only second pair overlapping; metatarsus, 3 pairs ventral, 1 retrolateral (small). Leg 2. Femur, 5 dorsals (3 in midline, 2 almost prolateral); tibia, 3 pairs ventral, 2 pro- and 1 retrolateral; metatarsus, 3 pairs and 1 median distal ventral, 3 pro- and 2 retrolateral. Leg 3. Femur, 6 dorsal; tibia, 2-1-2 ventral, 2 pro- and 2 retrolateral, 2 dorsal; metatarsus, 2-2-1 ventral, 3 pro- and 3 retrolateral, 2 large dorsal. Leg 4. Femur, 6 dorsal (all small); tibia, 2-1-2 ventral, 2 pro- and 2 retrolateral, 2 dorsal; metatarsus, 2-2-1 ventral, 3 pro- and 3 retrolateral, 1 large dorsal.

Abdomen oval. Genital plaque not so heavily sclerotized as in other species, with ridges shorter, more curved, centrally placed but widely separated (fig. 34). The copulatory canals are seemingly sclerotized grooves instead of tubular, or part of tubes not sclerotized; diverticula small, connecting canals long and forming almost a circle around the spermathecae (fig. 33). Spermathecae elongate, well separated, and obliquely placed. Fer-

PLATE V (Enlargements approximate)

Figure 31. *Calacadia rossi* Exline, new species, genital plaque of holotype female ( $\times 38$ ).

Figure 32. *Calacadia rossi* Exline, new species, left side of genital plaque, cleared ( $\times 76$ ).

Figure 33. *Calacadia coquimbensis* Exline, new species, right side of genital plaque, cleared ( $\times 76$ ).

Figure 34. *Calacadia coquimbensis* Exline, new species, genital plaque of female holotype ( $\times 38$ ).

Figure 35. *Calacadia osorno* Exline, new species, genital plaque of holotype ( $\times 38$ ).

Figure 36. *Calacadia osorno* Exline, new species, left side of genital plaque, cleared ( $\times 76$ ).

tilization canals long and twisted, similar to those of *C. rossi*. Many details of the genital structures can be seen through the thin cuticle, at least in the holotype. Spinnerets, colulus, and anal tubercle similar to those of *C. chilensis*, but anterior spinnerets more nearly contiguous, and not extending so far laterally. Posterior spinnerets slightly shorter than anterior, but bear the small terminal segment.

MALE. Smaller than female, with legs longer in proportion to body length, with less massive geniculate chelicerae. Total length, 7.16 mm.; earapace, 3.53 mm. long, 2.51 mm. wide (crushed so that height not measurable, nor accurate data on eyes obtainable). Eyes about as in female, but appear light in color, perhaps due to injury and loss of pigment. Chelicerae, mouthparts, and sternum as in female.

Legs as in female except that claws of tarsi bear more teeth, as in male of *C. chilensis*: leg 3 with 11 teeth on upper claws, lower claw with three very small teeth; three or four trichobothria on metatarsi very long as in male of *C. chilensis*; posterior metatarsi bear stiff hairs toward tips, modified, but not so noticeably as in female, with rows of fine spicules. Length of legs:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	2.98	3.72	2.60	1.30	10.60
2 .....	2.98	3.63	2.42	1.21	10.24
3 .....	2.51	2.98	2.42	1.02	8.93
4 .....	3.35	3.72	3.53	1.30	11.90

Spination of legs: Leg 1. Femur, 2 median and 1 small posterior, dorsal; tibia, 4 pairs ventral, 2 pro- and 2 very small retrolateral; metatarsus, 2-2-3 ventral, 2 pro- and 2 retrolateral (small), 1 small dorsal. Leg 2. Femur, 6-7 weak dorsal; patella, 1 weak distal; tibia, 4 pairs ventral, 2 pro- and 2 retrolateral; metatarsus, 3 pairs ventral, 1 pro- and 2 retrolateral, 1 dorsal. Leg 3. Femur, 7 weak dorsal; patella, 1 weak distal; tibia, 3 pairs ventral, 2 pro- and 2 retrolateral, 3 dorsal; metatarsus, 3 pairs ventral, 3 pro- and 3 retrolateral and 3 dorsal. Leg 4. Femur, 5 very small dorsal; tibia, 2-2-1 ventral, 2 pro- and 2 retrolateral, 2 dorsal; metatarsus, 3 pairs ventral, 3 pro- and 3 retrolateral, 3 dorsal (all quite long).

Palp (figs. 27, 29) very similar to that of other species, especially close to *C. dentifera* (Tullgren). Patch of teeth on lateral side of patella large but only slightly protruding; basal protuberance of tibia low and inconspicuous; terminal apophysis of tibia fairly long, with ventral carina; parts of the bulb also similar to *C. dentifera*, but with terminal apophysis or "fulcrum" straighter and completely enclosing slender, whip-like embolus, even at its tip.

REMARKS. As male and female were collected some 8° of latitude apart, there is no certainty that they are conspecific. They are placed together on morphological characters and pattern: the spination of the legs is similar, spines are mostly short and not overlapping, and the pattern of the abdomen and legs is similar. The male specimen is pale and soft, and had just passed through its ultimate moult when captured.

The male is similar to *C. dentifera* (Tullgren) from south Chile, which was described on the basis of a specimen with five pairs of ventral spines on the anterior tibiae; the figure of the palp shows a curvature of the tip of the terminal apophysis, the tegulum not so protruding as in *C. coquimbensis*, the tooth-bearing part of the patella more produced, and the tibia wider with a shorter terminal apophysis.

Simon's *C. radulifera* is also similar, but described with three teeth on the lower margin of the fang furrow of the chelicerae, and no mention was made of a basal apophysis on the tibia of the male palp. The female bears five pairs of ventral spines, according to Simon.

The specific name is an adjectival form of the province (Coquimbo) in which the female holotype was found.

TYPE LOCALITIES. Holotype female—Chile (Coquimbo): Fray Jorge Forest, collected December 11, 1950, by Drs. E. S. Ross and A. E. Michelbacher. Allotype male—Chile (Cautín): 25 km. east of Témuco, collected winter, 1951, by M. G. Smith. Both specimens at the California Academy of Sciences.

**Calacadia rossi** Exline, new species.

(Figures 19, 20, 21, 24, 31, 32.)

FEMALE. Total length, 7.56 mm.; carapace, 3.60 mm. long, 2.43 mm. wide, 1.35 mm. high. Carapace and legs burnt orange streaked with dark gray, legs irregularly annulated; chelicerae darker than carapace; sternum and coxae dull yellow; abdomen oval, mottled with dark gray (specimen somewhat denuded), seemingly without pattern (fig. 20).

Carapace more slender than that of *C. chilensis*, with slightly sinuous sides; cephalic region not much wider than thoracic. Both rows of eyes slightly procurved, lateral eyes slightly raised; median ocular area about as wide as long. Dimensions of eyes: A.M.E., 0.12 mm.; A.L.E., 0.20 mm.; P.M.E., 0.17 mm.; P.L.E., 0.24 mm. Distance between A.M.E., 0.06 mm.; A.M.E. and A.L.E., 0.11 mm.; P.M.E., 0.17 mm.; P.M.E. and P.L.E., 0.16 mm.; A.M.E. and P.M.E., 0.18 mm.; A.L.E. and P.L.E., 0.08 mm. Clypeus, 0.08 mm. at level of A.L.E., wider between edge and A.M.E.; sloping. Labium slightly broader than long, basal one-fifth excavated. Sternum, 1.86

mm. long, 1.48 mm. wide, nearly straight in front (fig. 19). Otherwise details of the cephalothorax as in *C. chilensis*.

Legs as in genotype. Second tooth on third claw reduced to a denticle; upper claws bear nine teeth on front pairs of legs, seven on posterior (fig. 24). Distal half of posterior metatarsi thickly clothed with long, stiff hairs, each of which bears one to three rows of tiny thorns along its length (fig. 21). Length of legs:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 . . . . .	2.34	3.28	2.00	1.22	8.84
2 . . . . .	2.25	2.79	1.82	1.10	7.96
3 . . . . .	1.16	2.52	2.04	1.00	6.72
4 . . . . .	2.70	3.69	3.15	1.36	10.90

Spinination of legs: Leg 1. Femur, 3 dorsal, 1 prolateral; tibia, 5 pairs ventral, 1 pro- and 1 retrolateral; metatarsus, 1 pro- and 1 retrolateral, 4 pairs ventral (somewhat irregular). Leg 2. Femur, 6 dorsal (3 in midline, 2 nearly prolateral, 1 almost retrolateral); tibia, 4 pairs ventral, 2 pro- and 1 retrolateral; metatarsus, 3 pairs ventral and 1 distal midventral, 4 pro- and 2 retrolateral. Leg 3. Femur, 7 dorsal (3 in midline and 2 on each side); patella, a distal spine-like bristle dorsally; tibia, 2 pro- and 2 retrolateral, 2-2-1 ventral, 3 dorsal. Leg 4. Femur, 6 dorsal (3 in midline, 2 nearly pro- and 1 nearly retrolateral, all weak); patella, 1 distal spine-like bristle; tibia, 2-1-2 ventral, 2 pro- and 2 retrolateral, 2 dorsal; metatarsus, 2-2-1 ventral, 3 pro- and 2 retrolateral, 3 dorsal.

Female genital plaque heavily sclerotized (fig. 31); ridges almost straight, inconspicuous due to covering of long hair. Spermathecae very large, parallel, ovate, contiguous throughout length, but not bulging as in *C. chilensis*. Details of structure similar to *C. chilensis*, but parts more crowded, and fertilization canal a long twisting sclerotized duct overlapping on opposite half (fig. 32).

Spinnerets as in *C. chilensis*, except that posterior pair appears much shorter, but may be reeided as in some specimens of *C. chilensis*.

REMARKS. This may be a synonym of *C. ambigua* (Nicolet) or *C. dentifera* (Tullgren). The first is not described in detail, the second from a single male specimen. If Simon was accurate about the armature of the chelicerae, *C. rossi* cannot be placed with *C. radulifera* (Simon). It is obviously separate from *C. chilensis* Exline, on the basis of structure of the genital plaque, and from *C. coquimbensis* Exline by the genital structures and the armature of the legs. Its separation from *C. osorno* Exline is not so definite: the armature of the legs is quite different, but series of specimens may show this to be a variable character. Structures of the genital plaque are sufficiently different in *C. rossi* and *C. osorno* to presume these represent different species,

but series of specimens may indicate a considerable variation in the width, length, and form of various organs; the general pattern of structures is much the same.

The species is named for one of the collectors, Dr. E. S. Ross, California Academy of Sciences.

LOCALITY DATA. Holotype female and two immature males—Chile (Nuble): 50 km. N.E. of San Carlos, collected December 26, 1950, by Drs. E. S. Ross and A. E. Michelbacher (California Academy of Sciences).

**Calacadia osorno** Exline, new species.

(Figures 18, 35, 36.)

FEMALE. Total length, 8.37 mm.; carapace, 3.35 mm. long, 2.42 mm. wide, and 1.40 mm. high. Chelicerae, legs, and carapace golden yellow to yellowish brown, irregularly marked with bright brown and gray; a large yellowish area behind eyes narrowing on thorax; legs with very irregular annulations, darkest beneath femora. Sternum and coxae yellowish with gray markings, especially on tips of coxae, and a narrow longitudinal marking on posterior tip of sternum. Abdomen mottled gray, without distinct marking over heart area, but with a dark patch on each side anteriorly; posteriorly with three pairs of chevron-shaped black markings (fig. 18); venter a little lighter than sides; spinnerets yellow.

Chelicerae geniculate but not especially heavy, with large boss; fang groove armed as in other species. Eyes dark, small; clypeus low, wider than anterior median eyes but not so wide as anterior laterals. Both eye rows appear nearly straight; anterior row procurved, posterior row a little recurved. Anterior median eyes less than a diameter apart, farther from laterals. Lateral eyes separated by about a diameter and situated on a common low tubercle. Posterior eyes about equally large and equally spaced, medians separated by nearly a diameter. Median ocular area a little wider behind than long, and much wider posteriorly than anteriorly.

Maxillae, lip, and sternum nearly as in *C. chilensis*; lip nearly as long as wide and deeply notched in basal fifth; sternum rounded in front except for being slightly excavated for lip, with shallow undulations on sides, pointed behind between hind coxae, longer than wide.

Legs with trochanters only slightly notched, anterior tibiae with only three pairs of spines; legs rather short, covered with short, dark, simple hairs, and sparsely with longer, perpendicular, white hairs; trichobothria in double rows on last three segments; posterior pairs of metatarsi with brush of stiff hairs at tip, modified with at least one row of denticles; anterior tarsi with 9–10 teeth on upper claws; upper claws of third tarsi with only seven, lower claw with two extremely fine teeth. Length of legs:

	Femur	Pat.-tibia	Metatarsus	Tarsus	Total
1 .....	2.14	2.60	1.67	0.98	7.39
2 .....	2.05	2.33	1.67	0.84	6.89
3 .....	1.95	2.23	1.95	0.65	6.78
4 .....	2.42	3.26	2.98	1.21	9.87

Spinination of legs: Spines only moderately long and stout; those of ventral side of tibiae do not overlap. Leg 1. Femur, 5 dorsal (3 on midline, 2 distally on prolateral side); patella, a distal bristle; tibia, 3 pairs ventral, 2 prolateral; metatarsus, 2-2-3 ventral, 2 pro- and 2 retrolateral. Leg 2. Femur, 7 dorsal (3 in midline, 3 prolateral, 1 retrolateral); patella and tibia, as leg 1; metatarsus, 2-2-3 ventral, 3 pro- and 2 retrolateral, 1 dorsal. Leg 3. Femur, 7 dorsal (3 in midline, 2 on each side); patella, 1 basal and 1 distal bristle; tibia, 2 (1 vestigial)-1-2 ventral, 2 pro- and 2 retrolateral, 2 dorsal; metatarsus, 2-2-3 ventral, 3 pro- and 3 retrolateral, 2 dorsal. Leg 4. Femur, 5 dorsal (3 in midline, one on each side); patella, as on leg 3; tibia, 1-1-2 ventral, 2 pro- and 2 retrolateral, 2 dorsal; metatarsus, 2-2-3 ventral, 3 pro- and 3 retrolateral, 1 dorsal.

Anterior spinnerets almost contiguous, with a very small second segment, preceded by a large colulus; medians very small and slender; posterior spinnerets very slender, well separated, shorter than basal segment of anteriors, bearing a short second segment with only a few spinning tubules. Anal tubercle normal, with two segments.

Genital plaque nearly as wide as long (fig. 35); external or copulatory ridges short, extending posteriorly only a little beyond the middle, raised, ending posteriorly in a large, sharp point; groove median to each, leading into posterior part of copulatory canal, which is larger, longer, and more vaulted than in other species, before turning dorsally and anteriorly to make loop outlining half of plaque. Internal structures (fig. 36) similar to *C. rossi*; diverticulum long and narrow; connecting canal following same path as in *C. rossi*, but heavier; spermathecae contiguous, not so long as in *C. rossi*; fertilization canals heavier but not so long nor so much coiled as in *C. rossi*, each drained by a small duct leading to ventral wall of vagina.

Comparative specimen: paratype female from near Purranque with total length of 6.70 mm.; carapace, 3.53 mm. long, 2.23 mm. wide, 1.30 mm. high; it had probably laid eggs before capture, as abdomen is short in proportion to carapace, and spinnerets are somewhat reeced. Carapace and legs darker than holotype, with abdomen having golden cast instead of uniform dull gray, and black markings more conspicuous. This specimen, an immature female, and two immature males agree with holotype in having only three pairs of spines on ventral side of anterior tibiae, and in the very shallowly notched trochanters.



REMARKS. *Calacadia osorno* is a small, well marked species, with only three pairs of ventral spines on the anterior tibiae; shallowly notched trochanters; short, conspicuous copulatory ridges on the genital plaque; and very slender and short posterior spinnerets. The internal structure of the genital plaque is quite similar to *C. rossi*.

The specific name is that of the Chilean Province in which the specimens were collected, and is a noun in apposition.

LOCALITY DATA. Female holotype—Chile (Osorno): 10 km. east of Puyehue, collected January 24, 1951, by Drs. E. S. Ross and A. E. Michelbacher. Female paratype, an immature female, and two immature males—(Osorno): Valley Forest, 18 km. west of Purranque, collected January 16, 1951, by Dr. Ross and Dr. Michelbacher.

The holotype is the property of the California Academy of Sciences; the paratype female is to be deposited at the American Museum of Natural History.

### ***Calacadia ambigua* (Nicolet).**

*Clubiona ambigua* NICOLET, 1849, Arácnidos, in GAY, Historia de Chile, T. 3, p. 438 (male and female).

*Mynthes ambigua* (Nicolet). SIMON, 1887, Mission Cap Horn, T. 6, p. E16 (male and female); 1898, Hist. Nat. Araign., ed. 2, T. 2, p. 245—TULLGREN, 1902, Bihang T. K. Svenska Vet.-Akad. Handl., Bd. 28, p. 71.

*Rubrius ambigua* (Nicolet). PETRUNKEVITCH, 1911, Amer. Mus. Nat. Hist., Bull., vol. 29, p. 536.—ROEWER, 1954, Kat. der Araneae, Bd. 2, Abt. a, p. 97.

Nicolet described *Clubiona ambigua* as having annulate spiny legs, with the aspect of a *Lycosa*; head with parallel sides, eyes all black, chelicerae very convex at base; abdomen elliptical with two longitudinal rows of oblique spots; male a little smaller than female, both sexes hairy. Simon described the male palp as having the patella scarcely as long as wide, its external border regularly set with small teeth, and bearing on the outside a weak tubercle; the tibia, equally short, with a weak external tubercle, and at the distal external angle a conical apophysis, which is prolonged under the segment in the form of an oblique carina, not reaching the base; tarsus voluminous and attenuated.

On the basis of the two descriptions, the species can be definitely assigned to *Calacadia*, but without more detailed information it is impossible to identify recent material with *C. ambigua*.

Nicolet had at least one male and one female from Valdivia, Chile.

### ***Calacadia dentifera* (Tullgren).**

*Mynthes dentifer* TULLGREN, 1902, Bihang T. K. Svenska Vet.-Akad. Handl., Bd. 28, pp. 69–71, pl. 7, figs. 5a, 5b (male).

*Rubrius dentifer* (Tullgren). PETRUNKEVITCH, 1911, Amer. Mus. Nat. Hist., Bull., vol. 29, p. 536—ROEWER, 1954, Katalog der Araneae, Bd. 2, Abt. a, p. 98.

Tullgren doubtfully placed his species in *Myntes* Simon (type species, *Coclothes subfasciatus* Simon = *Rubrius antarcticus* (Karsch), according to Roewer), because Simon had identified *Clubiona ambigua* Nicolet as *Myntes ambigua*, although he stated that his species was not closely related to *M. subfasciatus* (Simon). Tullgren's description is excellent, although he did not mention the dark eyes, nor the colulus and spinnerets. According to Tullgren: total length, 8 mm.; anterior tibiae with 5 pairs of spines underneath; cheliceral furrow with only 2 teeth on the posterior margin; and his figure of the male palp shows the toothed apophysis on the patella, the earinate apophysis of the tibia, with a very small hair-bearing protuberance on the basal part of the tibia, and the typical characters of the bulb; the terminal apophysis or "fulcrum" of Tullgren's species is curved at the tip. The description was based on a male from the lower Aysen Valley of southern Chile.

#### ***Calacadia radulifera* (Simon).**

*Rubrius radulifer* SIMON, 1902, Hamburger Magal. Sammel., Bd. 6, Heft 4, pp. 36-37.

This species clearly belongs to *Calacadia*. Simon described the females as being between 12 and 15 mm. in length, in which case this is the largest species known. The anterior median eyes are larger than in other species, being scarcely smaller than the anterior lateral eyes; the chelicerae are somewhat differently armed: the lower margin bears three small equal teeth, and the upper margin two larger teeth; the four anterior tibiae bear five pairs of ventral spines, and a smaller basal retrolateral spine; the genital plaque is wider than long, anteriorly rounded on each side, and truncated posteriorly. So far as described, other details agree with other species.<sup>2</sup>

The male is 10 mm. long, with much longer legs than the female, and the posterior eyes are a little larger and a little closer together. The anterior tibiae have only four pairs of spines, but bear two pro- and two retrolateral spines. Simon described the palp as having the patella no longer than wide, externally slightly convex, and with numerous irregularly placed, black spicules, forming a radula; the tibia is no longer but a little heavier than the patella, with a quite short and obtuse tooth directed anteriorly but produced underneath in an oblique carina; tarsus much longer than tibia and patella together, quite widely ovate, but drawn out considerably toward tip and quite sharp; bulb large, complicated, armed on the external margin with a long, black, substraight spine (the terminal apophysis) reaching the

2. Dr. Herbert W. Levi of the Museum of Comparative Zoology (Cambridge), in 1958, examined the type of *Rubrius radulifer* (Muséum National d'Histoire Naturelle, Paris). He has informed me that the chelicerae are armed as in other species of *Calacadia*, rather than as described by Simon.

apex of the tarsus. Seemingly there is no basal apophysis on the tibia of the palp, and the tooth-bearing portion of the patella is not sufficiently raised for Simon to have termed it an apophysis.

The male and female may not be conspecific.

Specimens were collected at Putabia, near Valdivia, April 20, 1893, and at Valdivia, March 31, 1893.

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